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VIEWS, NEWS AND INTERVIEWS.

A salesman for a prominent insulated wire manufacturing company, New York city, says that one day last week a stranger walked into the office of his company and made the following request: "I want to buy some submarine cable." "Well, what kind of submarine cable do you wish?" asked the salesman, politely. "Why, the kind they lay in the ocean, of course," replied the would-be customer.

There are over 300,000 series arc lamps in service in the United States at the present time.

"Hop" Flinn, of Kansas City, Mo., has resigned from the Missouri & Kansas Telephone Company and went to work for the Western Electric Company on February 15. Hop had been working for the Missouri & Kansas Telephone Company since 1879, beginning when he was a small lad as operator in the exchange at Hannibal, Mo., and has worked for the company continuously since. He is a first-class telephone man in every respect. He understands all of the practical work, including wiring switchboards and installing cables, both aerial and underground. During the underground work in Kansas City the Western Electric Company employed him to help splice cables, and the foreman said he was one of the best men he had ever seen. "Hop" is also quite a musician. Within the last few years he has been writing and publishing music and is getting quite a reputation along that line. He remarked when he left that if any one asked him for a recommendation he would merely say he had never worked for but one man, and for him 19 years, and refer them to Mr. Chas. W. McDaniel, superintendent of the Missouri & Kansas Telephone Company.

A new electric heater for the use of dentists in drying out the canal in the root of a tooth preparatory to filling the cavity has been patented. The drying is directly effected by a flexible metal probe, electrically connected, which is inserted while cold, or moderately warm, in the root canal of the tooth. As the current is admitted the heat generated in the probe dries out the moisture within the tooth.

The Hillside Coal and Iron Company, which was among the first to install electric haulage in coal mines in the vicinity of Pittston, Pa., has been making some figures as to the relative cost of haulage by mule and electricity. The figures are said to show, as far as two of the Hillside mines are concerned, an expense for haulage by mule power of 9.10 cents per ton, and a saving by electric haulage of 4.45 cents per ton. On the 541 tons hauled per day, the saving is $24.07, and for a year of 138¾ days it amounts to $3,339.71 The Hillside officials have come to the conclusion that the electric system effects a considerable saving, and that this saving will increase as the number of idle days increases, and with the increase in tonnage in the colliery.

AN ELECTRIC RAILWAY STREET SPRINKLER.

The annual report of Chief David Walker, of the Philadelphia Electrical Bureau, has been submitted to Director Ritter. Mr. Walker states that 28,632 feet of conduit and 203,591 feet of duct were laid in 1897. The receipts of the bureau, principally for licenses on poles, amounted to $46,304.04. The returns made by the various companies authorized by councils to maintain underground electrical structures, together with those laid by the city, show there have been placed under ground 2,379,388 feet of conduit, an increase of 31,393 feet over 1896, representing an aggregate of 17,675,306 feet of duct, an increase of 27,305 feet, of which the city owns 254,792 feet of conduit, an increase of 33.32 feet, or 1,766,366 feet of duct, an increase of 223,591 feet.

The Cataract General Electric Company, it is reported, is about to inaugurate the work of furnishing electric power to propel boats along the canals of New York State, by the erection of a cableway along the Champlain Canal for a distance of 60 miles. The stockholders of the Erie Canal Traction Company held their annual meeting last week. The directors elected were L. von Hoffman, W. G. Oakman, R. S. Hayes, G. G. Haven, T. C. Platt, F. W. Hawley, A. S. Heidelbach, Commodore P. Vedder and C. T. Lewis. At a subsequent meeting the following officers were elected: L. von Hoffman, president; F. W. Hawley, vice-president; C. T. Lewis, secretary.

An Electric Railway Street Sprinkler.

A new type of electric street sprinkler has lately been placed on the market by the Miller-Knoblock Company, of South Bend, Ind. The sprinkler is governed and run by motors of the same order as those used on trolley cars. The four sprinklers placed on each corner of the car are controlled by two rocking levers, one at each end, through which the force of the spray may be either increased or diminished as may be necessary for the width of the street.

Independent motors on the ends of the car furnish the necessary power to force the water to the desired distance, and thus a street 100 feet wide can be thoroughly covered.

Each sprinkler has a capacity of 2,500 gallons of water, which, by means of the force pumps, can be thrown to the full distance until entirely exhausted—a great advantage over the old way, that of making use of the force of gravity.

The pump consists of two cylinders, the inner one made of gun metal, and the outer, on which a great pressure is brought to bear, is a highly tempered steel casing. Within the cylinders are four independent rollers which, through their rotary motion, force the water from the perforations.

Two separate sprinklers of the ordinary kind are placed below the front and rear of the car for watering the space between the tracks. These are controlled by lock stops separate from those of the side sprays.

A newspaper correspondent, writing recently from Cuba, gives some interesting information about the personalities of the men forming the cabinet of the Cuban Republican Government. The vice-president, Mendez Capote, is described as a very bright and clever man, and a shrewd diplomat. He has the degree of LL. D., and Ph. D., from the University of Havana, and holds the rank of Brigadier General in the Cuban army. He is also secretary of the Spanish-American Light and Power Company.

Diamond Shoal Lightship.

Lightship No. 69 has now been anchored on the dangerous Diamond Shoal off Cape Hatteras in 30 fathoms for three months, and having ridden through the gales that prevail off that perilous spot on the Atlantic in entire safety during the roughest weather, has proved to the satisfaction of the Lighthouse Board that a light vessel can safely be maintained there. The captains have now become familiar with the light, and until the ship is replaced by a lighthouse, as originally intended, she will be a beacon to be carefully watched for and avoided.

Nos. 68 and 69 are sister steamships built at the yards of the Bath Iron Works at Bath, Me. No. 68 is the lightship off Fire Island. Both 68 and 69 are unusually powerful composite vessels, 122 feet 10 inches long over all, 29 feet 6 inches extreme beam, and 22 feet moulded depth. They are provided with propelling machinery to enable them to steam to their stations, and, also in case of necessity, to steam away from their dangerous positions. The engines are simple condensing vertical, with a cylinder 20 inches in diameter and 22-inch stroke, developing 350 horsepower at 150 revolutions. Steam is furnished at 100 pounds pressure by a steel Scotch boiler 12 feet 2 inches in diameter and 11 feet long. Two vertical donkey boilers furnish steam for the electric lighting plant, windlass, pumps, fog signals and for heating. The vessels are also fitted with steam steering gear, bells, a steam winch and full equipment of anchors and chain cables.

The two masts are of steel, each, exclusive of the flag pole, 64½ feet high. The electric lights are suspended at the mastheads, and are surrounded by a gallery for day signals.

To avoid chance of breakdown the electric plant on each vessel is in duplicate. Each plant consists of two marine generating sets with dynamo and engine, both built by the General Electric Company, of Schenectady, N. Y. The four-pole dynamos are eight kilowatt, 650-revolution machines, directly connected to 4½-inch by 4-inch double-cylinder engines. The switchboards are of Vermont marble, and the wiring appliances used throughout are of the type approved by the United States Naval Board of Inspection. The dynamos furnish 100-volt current to eight 100-candle-power lamps, four at each masthead, and forty 16-candle-power lamps throughout the vessel. The masthead lights are each enclosed in a lens lantern, three being used and the fourth held in reserve. Connected in circuit to the masthead lights is a device making and breaking the circuit and lighting and extinguishing the lamps at regular intervals. A fixed white light shows for 12 seconds, and is followed by an eclipse of three seconds. The focal plane of the lights is 57 feet above the sea, and they will be visible 13 nautical miles away in clear weather. Great reliance is placed upon the electric plants, and in their construction more than ordinary care has been taken on account of possible consequences of a breakdown through accident.

FIG. 1.—DIAMOND SHOAL LIGHTSHIP.

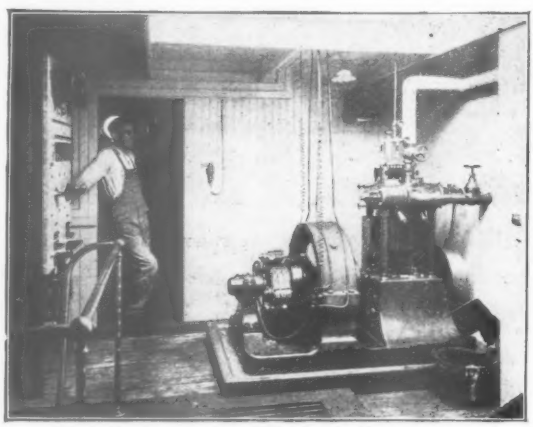


FIG. 2.—DIAMOND SHOAL LIGHTSHIP DYNAMO ROOM.

We are indebted to the courtesy of the New York *Tribune* for the photographs from which the illustrations were made.

Mr. George A. Redman, general superintendent of the Rochester, N. Y., Gas and Electric Company, visited New York city last week.

Receivers Appointed for Frank W. Hawley.

Two receivers were appointed last Friday for Frank W. Hawley, of 34 Nassau street, New York city, in supplementary proceedings, one in the Supreme Court and the other in the City Court. Justice Olcott appointed William H. Shepard receiver on the application of Oliver M. Farrand, who has a judgment against Hawley for $576 for jewelry, and Justice Bischoff appointed John M. Shedd, on the application of Charles L. Atterbury, a judgment creditor for $11,259. Mr. Hawley lives at the Murray Hill Hotel when in New York city. His wife, it is said, owns a large stock farm at Pittsford. Mr. Hawley is a director of the Cataract General Electric Company, the New York & New Jersey Ice lines, the Elcho Mining and Manufacturing Company, of Randolph, N. Y., and the Erie Canal Traction Company. His stock in the various companies in which he was interested is pledged to some 15 persons as collateral for loans of $100,000. The bank of Monroe, of Rochester, has notes of his for about $40,000, secured by collateral.

THE BRANDING OF PRIBILOF SEALS BY ELECTRICITY.

BY ELMER E. FARMER, E. E.

Without waiting for the question of pelagic sealing to be settled by international arbitration, Dr. David S. Jordan, United States Fur Seal Commissioner of 1896 and 1897, suggested a practical solution of the problem which involves the branding of the female seals and the penning up of the young males. This plan is feasible on account of the habits of the fur seal.

On land the animals are exceedingly gregarious. The American herd has selected a few of the rocky places along the shores of the volcanic islands of St. Paul and St. George for their breeding grounds. These "rookeries" are occupied by the "bulls" as soon as the ice breaks up in May, where they remain, fasting, until the middle of August. Soon after the bulls arrive a large number of the "cows" follow, and there is fierce fighting among these "beach masters" for inmates for their "harems." Each bull has a small area of ground over which he is absolute monarch. Being about five times as heavy as the female, he effectively resorts to force if the timid "cows" attempt to escape. He continually rounds up his 30 or 40 "cows" and loudly challenges all neighboring "beach masters" to cross the dare line. Each cow has but a single "pup." Every two or three weeks she is allowed to go to sea to feed, and may remain away for a week or longer.

The young males between one and seven years old are not sufficiently developed or courageous enough to fight their way onto the rookeries, and, consequently, have a separate "hauling ground," situated at either end of the rookeries. On land they sleep a great deal, but it is a common sight to see them sporting near the shore, leaping completely out of the water for breath as they playfully charge after one another. It is from the "hauling grounds" that the three and four-year-olds, the age at which the fur is in the best condition, are taken by the lessees of the government. These drives from the hauling grounds to the killing grounds are discontinued, however, about the middle of August, and many new arrivals of a killable age collect on the hauling grounds as they come in from feeding.

Pelagic sealing commences August

15 and continues for a period of six or seven weeks. During this time the young males could be driven from their hauling grounds and confined in a natural salt lagoon on the island of St. Paul. This lagoon has a close wire fence surrounding it, which was built and used during the past Summer.

On account of the polygamous habits of the seals, the killing of males is useful to the herd. An oversupply of males causes an increase in the number of rookery fights and a consequent greater fatality of pups, due to trampling. Pelagic sealing is highly destructive to the herd, as is evident when it is understood that the taking of each female with her unborn pup, leaves a pup on shore to starve to death. Thus three animals are killed, and since the pups are equally divided as to sex, two of these must necessarily be females, and the possibility of future progeny is cut off.

It is noteworthy that a seal never comes on shore with food in the stomach. After they have eaten their fill of squid and surface fish they float, back down, with the nose above the waves and the fore flippers over the ears, and sleep. It is in this position that they are captured by the sealers.

rapidly. The branding irons used were eight inches long by one inch square, and were attached "T" like to an iron rod four feet long.

In order to minimize the pain accompanying branding, Dr. Jordan suggested the application of the electric cautery as used by physicians, but on a larger scale. The experiments which followed showed that the intense heat of platinum caused little or no pain to the animal experimented on. A small, 300-watt dynamo was constructed, giving current up to 100 amperes. The prime mover was a small gasoline engine, and was belted directly to the dynamo pulley. From the dynamo two flexible conductors led to a light rheostat, on the end of which was connected the platinum cautery wire. The cautery handle was arranged with two changes of resistance, which could be altered by a movement of the thumb. The incandescent platinum would make a brand of any width up to two meters—the length of the cautery. Satisfactory and uniform results were obtained by using two movements across the back—the first to remove the hair and fur, the second to destroy the fur cells. It is evident that the current necessary to keep the platinum incandescent when burning the fur and searing the skin is much greater than under ordinary circumstances. Burned seal fur reduces to a peculiar tarry like mass, which refuses to be consumed at the temperature of red-hot iron and collects in a sheet on the branding iron. The cautery has the advantage of burning but a short length near the roots, when the remainder can be brushed away.

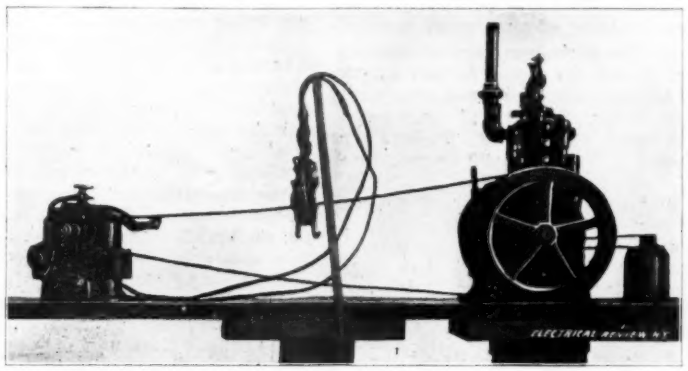


FIG. 1.—ELECTRICAL APPARATUS USED BY THE UNITED STATES FUR SEAL COMMISSION FOR BRANDING SEALS.

FIG. 2.—THE PRIBILOF ISLAND SEALS. A PART OF TOLSTOI ROOKERY.—PUBLISHED BY COURTESY OF THE UNITED STATES FUR SEAL COMMISSION.

Dr. Jordan, whose greatest interest in the matter seems to be to preserve this valuable herd, adopted the idea of branding the females. In 1896 Mr. Joseph Murray, government agent in St. Paul, branded a few pups and cows with some improvised irons. During the past Fall he demonstrated with a new outfit that branding with hot irons could be done

About the last of August the bulls lose their ferocity, and the rookeries can be entered with impunity. The pups have not then learned to swim well and can be driven back from the water in a band. The males are separated from the band and driven back to the rookery. A pup does a great deal of grumbling and snapping when he is picked up. Several amusing and a few painful incidents occurred before the dexterity necessary to handle them safely was acquired.

Recent experiments have improved the apparatus using the platinum wire and opened up another method which promises to be more rapid and fully as effective. In this method, the carbon electric arc under magnetic control is used. It has the disadvantage, as has the iron, of having to burn all the fur to the skin, but it has a compensating factor in the intense heat generated.

Philadelphia Electric Lighting Companies Combine.

Formal announcement was made last week that a controlling interest in the stock of all the independent electric light companies of Philadelphia had been acquired by the Pennsylvania Manufacturing Light and Power Company, incorporated under the laws of New Jersey, with a capital of $15,000,000. The announcement was made by Martin Maloney, president of the Pennsylvania Heat, Light and Power Company, which absorbed the local Elison company through the medium of a collateral trust two years ago. The new company will issue $15,000,000 collateral five per cent gold bonds in exchange for the stock of the minor companies. No organization of the new $15,000,000 enterprise has been effected yet, but Martin Maloney, it is said, will be made president. The announcement recently made that William J. Latta, an officer of the Pennsylvania Railroad Company, would be chosen president of the consolidation, has been denied explicitly by him.

ALUMINUM AS A RIVAL OF COPPER AND BRASS FOR ELECTRICAL CONDUCTORS.

BY ALFRED E. HUNT, S. B.*

Copper has been used for electrical conductors very largely in the past, due to its comparatively high electrical conductivity, power of withstanding corrosion, ease of soldering and brazing, malleability, tensile strength and ductility. The exceptions in the past have been in telegraph wires of soft wrought-iron and the brass, iron and steel used in the parts of electrical machinery.

Aluminum has already been used successfully for the purpose, and this article is written to call attention to its comparative merits as an electrical conductor.

The following facts regarding the metals, copper and aluminum, in bars, rods, and wire suitable for electrical conductors, need first to be considered:

Copper has a specific gravity of 8.93 (authority, Association of Copper Manufacturers of the United States, 1893); an electrical conductivity, when pure and soft annealed, reckoned at 100 in the Matthiessen Scale, but as ordinarily used in electrical conductors of about 98—97.61 (authority, Prof. W. C. Roberts-Austin); a tensile strength of from 16,500 pounds per square inch in soft annealed, pure copper (authority, Carnegie's Hand Book) to 65,000 pounds per square inch in hard-drawn bars; and a selling price of about 14 cents per pound in the United States, and an equivalent selling price of 130 marks per 100 kilograms in Germany, for wire, bars and rods such as are used for electrical conductors.

Aluminum has a specific gravity of 2.68; an electrical conductivity (commercially pure metal) of 63.00 (authority, Chas. F. Scott, of the Westinghouse Electric Company, and Prof. Jos. W. Richards, of Lehigh University); a tensile strength in pure soft wire of 26,000 pounds per square inch, and in hard-drawn rods or wire of 40,000 pounds per square inch.

Special selling price: The firm of Aron Hirsch & Son, of Halberstadt, Germany, are ready to sell aluminum conductors in the form of rods, bars, plates and wire drawn to 2½ millimeters in diameter, at a special low rate of 280 marks per 100 kilograms, for large quantities of metal, and similarly the Pittsburgh Reduction Company will sell rods, bars, plates and wire drawn down to No. 12 Brown & Sharpe gauge (eight hundredths of an inch diameter), in large special orders for electrical conductors, at the rate of 29 cents per pound at their works in the United States.

These prices are special rates, below the regular prices for aluminum which these concerns have decided to make for electrical conductors alone, in order to favor the introduction of aluminum for this purpose and to overcome the handicap which aluminum has, occasioned by its lower electrical conductivity than copper, in the matter of special low relative prices.

From these facts it is evident that:

1. Any given volume of copper is $\frac{8.93}{2.68}$ or 3.332 times heavier than an equal volume of aluminum.

2. The equivalent price of 14 cents per pound for copper for any length of any equivalent section of aluminum wire or bar, would be 14 cents times the factor 3.332, or 46.65 cents per pound. That is, 1,000 feet of wire of, say, one-tenth inch diameter, would cost equally as much if bought of copper at 14 cents per pound, or aluminum at 46.65 cents per pound. Aluminum therefore sold at 29 cents per pound is only about 62 per cent of the cost of copper at 14 cents per pound, section for section.

3. Reckoning the copper conductor to have its maximum of 100 per cent conductivity, and the aluminum to have a conductivity of 63 per cent (which the Pittsburgh Reduction Company are ready to guarantee for their special pure aluminum metal for electrical conductors), then for an equivalent electrical conductivity a given section of copper that can be placed at 100 should be increased in area in round numbers to 160 to give an equal conductivity.

4. Due to their relative specific gravities, the weight of the given equal length of the aluminum conductor with 160 sectional area will be only 48 per cent of the weight of the copper conductor with sectional area of 100, having the same electrical conductivity.

$100 \times 8.93 = 893$, weight of the copper.

$160 \times 2.68 = 428.8$, weight of the aluminum.

$\frac{428.8}{893} = 48$ per cent.

5. As to their relative cost for electrical conductors of equal conductivity, aluminum at 29 cents per pound is the most economical conductor as compared with copper at 14 cents per pound.

Taking, as an illustration, an aluminum conductor to replace a copper wire of No. 10 Brown & Sharpe gauge (about one-tenth of an inch diameter), the aluminum wire of equal, in fact somewhat superior, electrical conductivity would be of No. 8 Brown & Sharpe gauge (slightly over one-eighth of an inch diameter).

The weight of a mile of No. 10 copper wire is 162.32 pounds; and its cost at 14 cents per pound would be equal to $22.72.

The weight of a mile of No. 8 aluminum wire would be 79.46 pounds and at 29 cents per pound would cost $23.04.

Forty-eight per cent of the weight of the No. 10 copper wire, which will give equal electrical conductivity in aluminum wire, would only weigh 77.91 pounds; so that more accurately, $22.59 would be the cost of a mile of aluminum wire at 29 cents per pound to replace a mile of No. 10 copper wire at 14 cents per pound, costing $22.72.

6. The Continental requirements in tensile strength for soft copper wire, rods, and bars used as electrical conductors is 22 kilograms per square millimeter; the English requirement being similarly 14 tons per square inch, and our American requirement is about its equivalent of 32,000 pounds per square inch.

Aluminum wire, rods, and bars will be furnished of 63 per cent electrical conductivity, which will have an equal tensile strength per unit of area with the copper, and, therefore, with the electrical conductivity equivalent of 48 per cent of the weight of the copper and sectional area of 160 against the area of the copper section 100, the tensile strength of the aluminum conductors will be as 100 for the copper is to 160 for the aluminum. This would mean if a square inch of copper conductor was used of, say, 32,000 pounds per square inch tensile strength, the equal conductivity area of 1.6 inches of aluminum would have a tensile strength of 51,200 pounds.

It has been already determined that with aerial lines the snow and ice load is practically as heavy on lengths of small wire as upon larger sections, so that no objection upon this score can probably be found to the use of the larger sections of aluminum wire.

Both on account of having only 48 per cent of the weight and on account of having about 60 per cent more strength, the aluminum conductor could be used in much longer spans between supports, and the number of expensive poles and insulators can be materially diminished. Properly drawn aluminum wire is as tough and will stand bending as severely without breaking as soft copper wire. The toughness of aluminum wire is, however, greatly modified by the care and skill used in manufacture. If it is drawn too severely through the dies or is not well annealed at the proper intervals in the drawing operation, it is finished much more brittle than when properly manipulated.

Hard-drawn copper wire, especially that in the smaller sections drawn through diamond dies, is furnished with a tensile strength of 65,000 pounds per square inch. What the maximum tensile strength of the best pure hard-drawn aluminum will reach under similar favorable conditions for developing the maximum tensile results has not yet been determined, but from experiments already made it can quite surely be predicted that at least 50,000 pounds per square inch can be obtained, and, perhaps, even higher strength still.

Aluminum hardened with a few per cent of alloying ingredients can be furnished in wire with a tensile strength far in excess of what can be obtained in pure aluminum. Experiments are now being made by the Pittsburgh Reduction Company to determine just what alloy will furnish the maximum tensile strength, together with maximum electrical conductivity. From results already obtained it can surely be predicted that an alloy of aluminum can be furnished which, drawn into wire, will have a tensile strength of at least 65,000 pounds per square inch and electrical conductivity of more than 50 in the Matthiessen Scale. This material to rival hard-drawn copper wire and the silicon-bronze materials which are now in use, where maximum tensile strength together with good electrical conductivity are required.

The power of withstanding corrosion is greatly in favor of aluminum as an electrical conductor over copper. Copper does not change in dry air, but in moist air it becomes covered with a green layer of basic carbonate of copper, which itself has a corroding action and does not coat and protect the underlying copper from further corrosion. Ammonia in contact with copper absorbs oxygen and the copper dissolved in consequence of the formation of a soluble cuprio-oxide and ammonia. This action is especially a source of trouble where copper wire is used in connecting rail joints in the tracks of electrical railroads, where the ground is often subjected to ammoniacal solutions.

Aluminum similarly is not acted upon in dry air, and the corrosion in moist air is of the oxide of aluminum, alumina, a harmless salt which forms an impenetrable coating on the metal and protects it from further corrosion to a considerable extent. Ammonia solutions act on aluminum only upon the surface, attacking it and leaving behind a more resisting surface coating of a brown color containing silicon, which resists corrosion from dilute mineral acids and dilute solutions of organic acids as well as moist and dry air. Subject to sulphur gases such as locomotive flue gases, aluminum withstands corrosion better than copper.

(To be concluded.)

*President of the Pittsburgh Reduction Company.

The "Chainless" Fad.

The craze for "chainless" bicycles is bearing fruit, says the *American Machinist*. A Philadelphia inventor has recently patented a machine in which a large wheel on the crank shaft is belted to a dynamo or electric generator, and then an electric motor is belted to the rear wheel. It is certainly "chainless," also senseless.

Boston Electric Protective Association.

At the recent annual meeting of the Boston Electric Protective Association, the following officers were elected for the ensuing year: Frank Ridlon, president and general manager; C. A. Stewart, superintendent, and F. H. Williams, treasurer.

C. S. Sweetland, Benjamin Friedberg and R. H. Ingraham have applied to the city council of Kansas City, Mo., for a franchise to operate an electric light plant in that city. They offer two per cent of the gross receipts for the concession.

The Boston Electric Light Company's New Plant.

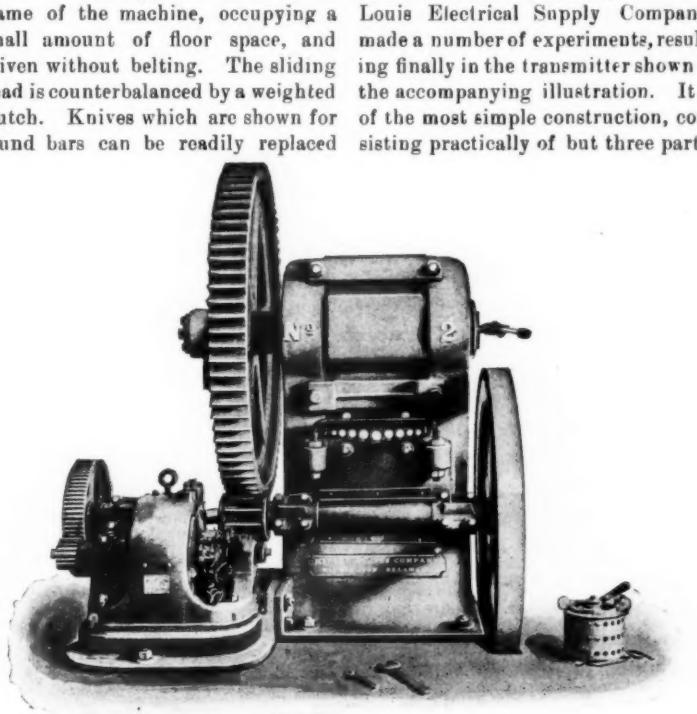
The Boston Electric Light Company has concluded a contract with the General Electric Company for the equipment of its great generating station now in course of erection. Up to the present the Boston Electric Light Company has operated a number of stations throughout Boston. Two of these, however, have recently been abandoned to make way for the new railroad stations now being built, and the company has therefore decided to consolidate all the small stations into one mammoth generating plant to be erected in South Boston.

The system will involve the use of the three-phase alternating current, selected on account of its great flexibility and the fact that by its use the value of the present distributing system will not be diminished. The dynamos will be four in number, each of 1,500 kilowatts, with a reserve capacity of 50 per cent, giving a total output of 12,000 horse-power. They will be of the revolving field type, a type adopted to permit a high voltage to be taken directly from the dynamo to the wires without the use of transformers to increase the pressure. The revolving field on each dynamo will be mounted on the shaft of an engine, and the voltages of the generated current will be 2,200 volts. To excite these dynamos, two smaller ones, each of 100 horse power, will be driven by a synchronous motor. In addition, 18 large synchronous motors, each of 200 horse-power, will drive 36 arc lighting machines. Each motor will be set between two Brush 125-light arc dynamos, the shaft of the motor armature being extended to become the shaft of the armature of the arc dynamos. The power transmission for this arc lighting plant, therefore, will be confined to the width of the dynamo-room. If this system were not employed small engines would have to be used, whereas, by the method selected, only the large main engines will be employed.

For the power circuits, that is, for the stationary motors, two rotary converters, each of 500 kilowatts or 650 horse-power, are included in the contract. These will take the three-phase alternating current and convert it into direct current at about 550 volts. For the incandescent lighting system the three-phase current wires will simply be connected to the existing network, using the transformers now in use.

An Electrically Driven Bar Shear.

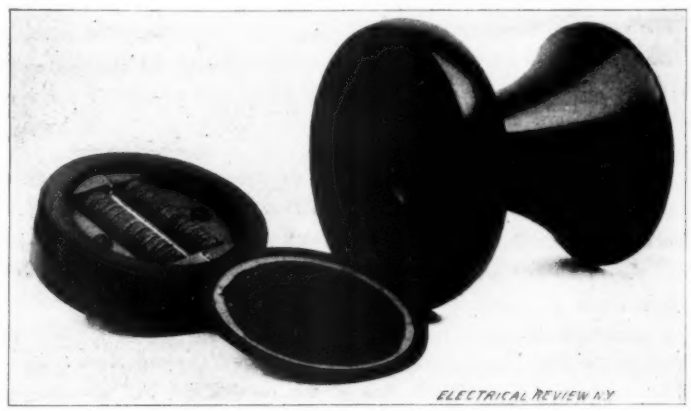
In the accompanying illustration is shown a bar shear, with wide head, manufactured by the Hilles & Jones Company, of Wilmington, Del. A special feature of this tool is the driving by an electric motor directly connected to the flywheel shaft through a pair of cut gears. This motor is mounted on a base plate which is securely bolted to the main frame of the machine, occupying a small amount of floor space, and driven without belting. The sliding head is counterbalanced by a weighted clutch. Knives which are shown for round bars can be readily replaced with knives suited for flat bars, or for other shapes if desired. This type of machine is furnished in a number of other sizes, the larger types having capacity for shearing bars four inches by four inches cold. This method of driving the Hilles & Jones Company have used largely on single and combined punches and shears and other tools of this description.



AN ELECTRICALLY DRIVEN BAR-SHEAR.

The Ruebel Telephone Transmitter.

After all it seems that the simpler any electrical or other device is made the more efficient it is liable to be and the less subject to disarrangement. Ever since Professor Hughes's microphonic experiments, inventors by the score have brought forth transmitters innumerable; some good, some bad, and others of variable qualities. Among others Mr. Ernest Ruebel, of the St. Louis Electrical Supply Company, made a number of experiments, resulting finally in the transmitter shown in the accompanying illustration. It is of the most simple construction, consisting practically of but three parts, aside from the separate carbon disks. A shallow rubber chamber contains two semi-circular carbon base blocks, between which two rows of extremely small carbon disks are arranged, each row insulated from the other by a strip of insulating material. A carbon diaphragm serves as cover to the box, the diaphragm being held in place by the mouthpiece. From each carbon block a screw makes connection with the binding posts on the back. The distance between the disks and the diaphragm is such that when the latter is in place and the rows of disks are horizontal, they rest rather loosely against the diaphragm, which, of course, completes the circuit. Repeated tests have demonstrated that the transmitter works equally well on short or long lines. In the latter case more battery is of course used, up to five or six cells. The apparatus has no granules or dust to pack, cake or settle; on the contrary, constant use rather improves its quality, because the vibrations of the diaphragm cause a slightly rotating motion to be given to the disks. The outer surface of the diaphragm is coated with a water-proof paint, so that the transmitter can be left under water without impairing its usefulness. Nothing but carbon and hard rubber is used in its construction.



THE RUEBEL TELEPHONE TRANSMITTER

Plans Ready for a City Lighting Plant.

An esteemed correspondent of the ELECTRICAL REVIEW states that the plans and specifications for the city electric lighting plant at West Point, Miss., are now in the hands of the printer. The contract will be let on March 8. Copies of the plans and specifications may be obtained by addressing the Mayor, West Point, Miss. The city has also on file plans for a reservoir to be added to the waterworks plant.

Telephone Apparatus Wanted.

Mr. G. E. Donald, of Donald & Kamper, Meridian, Miss., informs the ELECTRICAL REVIEW that several gentlemen in that city are arranging to install an independent telephone system. They desire to correspond with telephone manufacturing companies and may wish to purchase a second-hand switchboard. It is proposed to install about 300 telephones at the start.

Franklin Institute.

At a meeting of the electrical section of the Franklin Institute, to be held at Philadelphia this evening, February 23, Mr. Herbert Laws Webb, of the New York Telephone Company, will read a paper entitled "The Telephone Exchange."

Mr. T. D. Lockwood, of the American Bell Telephone Company, Boston, was among the out-of-town visitors to New York city last week.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.
NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

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The forthcoming international meeting of gas, electric light and street railway associations at Laredo, Tex., beginning March 9, promises to be an important affair. The local and connecting railways in Texas and the surrounding states have offered special rates of fare to delegates, which will aid in making the attendance large, as it deserves to be.

A verdict for unusually heavy damages was rendered in a Brooklyn, N. Y., court last week, the amount being $25,000. The verdict was rendered in the suit of Carrie E. Read against the Brooklyn Heights Railroad Company for the loss of her husband, John J. Read, who was killed in a trolley accident.

The most encouraging sign of the times is the superabundance of gold in the United States Treasury, the net amount now aggregating $166,000,000. The situation is the exact converse of that which existed two years ago, when the government gold reserve was constantly diminishing and the Treasury offered unusual inducements for deposits of gold. The Secretary of the Treasury has directed the Sub-Treasurer at New York to refuse in the future to accept gold against the telegraphic transfer of currency or against actual currency shipments from Washington to out-of-town points on orders placed in New York. Hereafter no telegraphic transfers will be made.

The handsome list of exhibitors who have already contracted for space in the forthcoming electrical exhibition in Madison Square Garden, New York, was published in the ELECTRICAL REVIEW last week, and reflects great credit on the management of that enterprise, both for its numbers and the high grade of manufacturers which it represents. As the time draws near for the opening of the electrical exhibition, which will be held during the month of May, a number of other important p'ans and arrangements which the management has had under way are coming to a head very satisfactorily. The exhibition promises to be the most successful affair of the kind ever held.

The disaster to our battleship "Maine" in the harbor of Havana has caused intense excitement throughout the country and especially among the electrical fraternity, which includes within its ranks a large number of naval officers who have either retired or resigned. The suspicion that our formidable battleship was destroyed by a torpedo or submarine mine is all the more interesting to electrical engineers, as it is probable that the electric current performed an important part in the work of destruction. A competent board of inquiry has been promptly organized and the American public is patiently suspending judgment until the findings of this board are made known. In the meantime, the country is in mourning for the brave officers and men who met such a tragic death in the performance of their duty.

In this issue of the ELECTRICAL REVIEW will be found a very interesting illustrated description of the branding of fur seals at the Pribilof Islands by means of the electric current. This is the first authentic description of the important work which was carried out last Summer by Dr. David Starr Jordan and his assistants from Leland Stanford, Jr., University. The photographs from which the illustrations were made are used by permission of the United States Fur Seal Commission. The electrical branding method seems to be the most feasible and least painful of any yet advanced for the preservation of the female seals. It is to be hoped that the government will see fit to develop the possibilities of this experiment.

The New York daily papers announced last week that the Sprague Electric Company had offered $1,000 reward for information which will lead to the arrest and conviction of the party or parties responsible for the disappearance between February 11 and February 14 of certain papers from a desk in the offices of the company. Mr. Frank J. Sprague states that the papers contained the results of a thorough investigation made by his company's engineers regarding a new method of using electric power on the elevated railroads of New York. The results were very important and had been reduced to writing. The reports were locked in a desk and when wanted were not to be found. The Sprague Electric Company has its suspicions as to the culprit, but will not make them public at the present time.

Mr. Howard Gould's yacht "Niagara," which was launched last week, is probably the most splendid and luxurious pleasure craft afloat. The electrical equipment of the vessel is especially complete. Current is furnished from two dynamos of a capacity of 800 sixteen-candle-power lamps, reinforced by a storage battery. The vessel is equipped with a search-light and circuits have been arranged for handsome electric lighting displays on gala occasions. The ship will be electrically heated throughout, and electric cooking devices are installed in the galley. There will be electric heaters for curling tongs, warming pans, chafing dishes and smoothing irons. An electric lift connects two of the decks, and an electric motor will operate a large orchestrion. In fine, the electric current has been put to every possible use in the operation of this palatial yacht.

In the ELECTRICAL REVIEW for September 29, 1897, a very interesting story was printed about the experience of a naval officer, in which it was told how a warship came near being blown up while at heavy gun practice at sea. The point of the story was that the officer in command of one of the turrets on the battleship attempted to fire one of the big guns before the breech-block had been closed. This would have resulted in exploding the magazine of the ship and the probable total loss of vessel and crew. An accident was prevented by the quickness of a gunner's mate, who seized the electric wires forming the firing circuit and broke them, thus preventing the discharge of the gun. The story closed with this prophetic utterance: "Suppose the accident had occurred, what do you imagine the verdict of a board of inquiry as to the cause of the loss of the ship would have been?" On the day after the blowing up of the "Maine," this article from the ELECTRICAL REVIEW appeared in full in the columns of the New York *Sun*, thus showing the resources of that excellent paper for preserving and filing matters of value and timely interest.

Wall Street and the Electrical Stock Market.

Nothing but feverish excitement and a nervous state of uncertainty could be expected to follow the announcement of the disaster to the "Maine." Wall Street is always keenly responsive to calamities which may bring on international complications. Timid or weak holders of stocks relinquished them on the moment it was suggested that war might follow certain possible, though scarcely probable, discoveries. The Dupuy de Lome incident was followed by the "Maine" explosion, and the stock market responded to both in the shape of a general depreciation in values.

Metropolitan Street Railway supplied the sensation of the week by dropping from 171 to 157 on Monday on the withdrawal of the supporting orders which were in evidence last week. During the rest of the week the stock fluctuated between 154 and 160. The issue of the additional $10,000,000 in stock to be allotted to present holders in the proportion of 1 to 3 was the reason given for last week's advance.

General Electric on sales of about 20,000 shares declined three points from 38¾, which was the highest figure reached on Monday. The debenture fives were quiet, only one sale at 100½ being reported. Despite the persistent rumors to the contrary nothing has been done in regard to the holders of the preferred stock. On the other hand it is known by insiders that the company is doing a phenomenal business, beating all records. In the railway department comparisons with the past two or three years show great increases. During the past week contracts were booked for supplying motors to various companies throughout the country. Among them were orders for 326 for the West End, leased by the Boston Elevated, 200 for the Cincinnati Street Railway, besides a lot of smaller orders from various sections.

Brooklyn Rapid Transit was well bought throughout the week, the price advancing a fraction over three points from 40 on Monday to the highest figure on record. The entrance into New York, via the bridge, is expected to prove so profitable to the company as to warrant higher prices for its securities. At least, that is what insiders tell their friends.

Western Union was rather quiet, prices fluctuating between 91 and 93. There has been for some time past a disposition on the part of certain capitalists to buy it as an investment, it being regarded as a sure 4 per cent stock, with prospects of improving business.

Edison Electric of New York fluctuated between 133½ and 135, the latter figure being on a small lot. The first 5's sold at 112¼ to 112¾. The earnings of the company, inclusive of high-tension systems, for the month of January were: Gross, $298,307, and net, $147.889, the latter being an increase of $23,345 over January, 1897. As foreseen in this column recently, the company has voted to increase its capital stock by 15 per cent, offering the additional amount to present stockholders at par. Payment is required in three equal instalments, March 10, May 2 and August 2. The new stock does not carry interest or dividends until fully paid, but stockholders can anticipate the full payment, receiving 3 per cent discount until the stock is delivered.

Interest upon the scrip of the Westinghouse Electric and Manufacturing Company, March 1, will be paid to holders of record on that date.

Electrical stocks on the Boston Exchange were traded in to a moderate extent during the week. Bell Telephone from 269¾ Monday sold down to 265 Thursday, recovering and closing one point above the low figure. Erie Telephone advanced 2 points to 72, later reacting and closing at 70½. General Electric preferred sold between 94 and 96, with 95 bid offered at 96 on Saturday. New England Telephone gained 1½ to 134, but during the latter days of the week lost its gain and closed at 132½.

The annual report of the Erie Telegraph and Telephone Company, for the year ending December 31, shows gross earnings of $364,550, an increase of $49,636; net earnings, $226,647, an increase of $18,007; surplus, $34,647; total surplus, $374,448, an increase of $40,638.

On the Philadelphia Exchange dealings in Electric Storage Battery stocks were nominal at 23½ on Monday and 22 to 23 the end of the week, while the preferred ranged between 26½ and 27. Pennsylvania Heat, Light and Power, on sales of over 10,000 shares, gained and closed ¼ above Monday, at 22⅞.

The announcement was made during the week that the Pennsylvania Manufacturing, Light and Power Company had acquired control of a majority of the stock of the Pennsylvania Heat, Light and Power Company, also full control of all other electric light companies of Philadelphia, except the Southern and West End and the Kensington companies. The control of these three roads is likely to be obtained before the final consummation of the consolidation. The Pennsylvania Manufacturing Light and Power Company, the New Jersey corporation formed to consolidate the electric light companies of Philadelphia, is expected to issue $15,000,000 stock and $15,000,000 bonds. The company stands ready to purchase the minority interest in the Pennsylvania Heat, Light and Power Company on the same terms as the majority interest was secured.

An official of the Walker Company says the recent decisions do not prevent them from selling apparatus, and if the injunctions should be made permanent on appeal, they will have other devices that will take the place of those enjoined and which will be improvements.

North American was moderately active during the closing days of the week, and quotations advanced from 5¼ to 6⅜. There was very good buying of the stock on Thursday, which was said to be for account of inside interests, and was based on the prospects of an appreciation in the value of the assets of the company.

It was generally announced throughout the electrical trade on Saturday, February 19, that an advance of one-half cent per pound had been decided upon by the manufacturers of weatherproof, office and annunciator wire.

RAY.

Wall Street, February 19.

The publisher of the *Electrical World* is soliciting advertising for the twenty-fifth anniversary number of his publication. We suggest to advertisers whom he will annoy with his oily arguments that they ask him to produce the first copy of his journal under its present name, and then perform a little problem in arithmetic. His paper is not 25 years old, nor is there any American electrical weekly in existence to-day which enjoys that ripe old age. The ELECTRICAL REVIEW is the oldest electrical weekly in America, as has been proved not only by ourselves, but by our contemporaries several times. The twenty-fifth anniversary number of the pale green journal is yet a long way off—over 10 years, in fact—its first issue bearing date of April 28, 1883. If it lives two months longer, it will be just 15 years old.

Meeting of Electric Associations at Laredo, Texas.

The ELECTRICAL REVIEW is informed that for the meeting at Laredo, Tex., of the electric light, electric railway and gas associations on March 9, 10, 11 and 12, the local railroads and connecting lines in Texas, New Mexico, Oklahoma, Arkansas and Louisiana will make special rates for delegates who attend. These rates are based on the 167 miles' distance plan as follows: The round trip fare from points 167 miles or less from Laredo will be $5. Beyond 167 miles the rate will be one cent per mile each way added to the $5 rate for that distance. Local ticket agents have full particulars for the dates of selling tickets and the time limits.

A New Telephone and Telegraph Company.

The Knickerbocker Telephone and Telegraph Company has been incorporated, with a capital of $7,500,000, to construct and operate lines of telephone from New York city throughout New York State and New Jersey. The directors are Samuel B. Lawrence, Francis B. Lowrey and Charles L Horton, of Manhattan borough; John B. Summerfield, Henry M. Haviland, George E. Spencer and Henry C. Everdell, of Brooklyn borough. The company paid into the state treasury an organization tax of $9,375.

Puritan Electric Company in the Sheriff's Hands.

A deputy sheriff took charge last Friday of the Puritan Electric Company's office at 11 Broadway, New York city, on executions aggregating $3,663, in favor of the Manhattan General Construction Company, on notes. The Puritan Electric Company was incorporated in October, 1896, with a capital stock of $100,000, and manufactured arc lamps. Stuart W. Wise was president, and the concern was regarded as being allied with the Manhattan General Construction Company.

American Institute of Electrical Engineers.

The 122d meeting of the institute will be held at 12 West Thirty-first street, New York city, on Wednesday, February 23, 1898, at 8 o'clock P. M. A paper will be presented by Mr. Charles P. Steinmetz, of Schenectady, N. Y., on the "single-phase induction motor." Advance copies will be distributed at the meeting, or mailed upon application to the secretary.

TOLD IN THE DYNAMO-ROOM.

Jim was in trouble. It would not have been so bad any other evening in the week, but on Wednesday, which for the past few weeks had become the evening when he called on Miss Hoyt at the Metropolis Hotel, it was too bad that it only lacked an hour before starting-up time and one of the arc circuits was still reported "open" by Bert. Jim had driven over that circuit and carefully inspected almost every inch of it, with the result that he had found it apparently all right. But repeated tests with the ever useful magneto indicated that a rather long loop, running along one of the business streets, was still the cause of the trouble. There were not over half a dozen lamps on that loop and, search as he might, he could not find a connection, or screw, or binding-post that was not good and tight. So he reluctantly hurried back to the station with a vague hope that somehow or other the circuit might have closed in the meantime.

"Well, boys, I hate to do it, but I guess I'll have to telephone for the boss," remarked Jim, as he stepped up to the telephone booth and called up Mr. Evans, who had returned from his trip that morning. He explained the difficulty to the superintendent, who somewhat sharply told him that if the line was open on that loop it should be an easy matter to find the trouble, saying he would meet Jim at a certain store within 10 minutes.

"Golly, but the boss is hot about it," spoke Jim, as he emerged from the booth.

"Well, I don't blame him much," said Benson, as he wiped up a small pool of oil that had collected in one of the band wheels. "What's the use of having an electrician who can't find an open circuit? Guess you are thinking too much about that girl of yours lately."

"Never you mind about the girl, Benson," retorted Jim, "she's all right and up to voltage, too. Now don't start the B circuit until we telephone you."

"It's strange about Jim, I don't know what has got into him of late," remarked Bert, giving a final look at the switchboard, to make sure that B circuit was disconnected from the dynamo, but closed by means of a short switchcord. "First thing you know he'll be looking for a job."

"Yes, I'm afraid so," spoke Benson, "I hope the trouble is something unusual, or Evans won't let Jim off so easy."

Meanwhile Jim had hurried to where he found Mr. Evans waiting for him.

"Now Jim, what is the trouble this time?" asked Evans a little impatiently.

"Well, sir, I wish I knew. This circuit is open between here and Heyman's store, as near as I can find out, but I can't locate the exact spot."

"In that case it is no doubt in one of the lamps, and as there are only six on this loop it ought not to take us that many minutes to find the trouble."

Commencing with the first lamp, Mr. Evans made Jim connect the terminals of the magneto to the binding post of the hanger-board, but no sound came from the bell. The same negative results were observed at the second, third and fourth lamps, but at the fifth a good strong ring came from the magneto.

"There you are, Jim," exclaimed Mr. Evans, looking up to our lineman, who stood rather nonplussed on the stepladder, "now see what ails that lamp."

Jim lifted up the carbon rod. It came down all right until both carbons were in contact. He took off the lamp case and found everything in first-class order, and so reported to Mr. Evans.

"Well, that is certainly strange," replied Evans, glancing at his watch, "we have just about time to get another lamp, so hand that one down to me and we'll examine it at the station."

Jim accordingly took off the globe, but no sooner did he have it clear off the lamp, than he exclaimed:

"Gee, whiz! What blamed fool has been at this lamp? Just look at this!" pointing to the lower carbon holder and the carbon, which had a piece of wrapping paper wound neatly around the lower end, presumably to hold it tight in the clamp.

Quite an interested audience, consisting of the proprietor and several clerks, had collected by this time around Jim and the superintendent, and when the proprietor heard Jim's remarks, he innocently explained that shortly after the trimmer had put new carbons in the lamp, the moving of some heavy boxes on the upper floors had jarred the ceiling so that the carbon fell out, and not wishing to trouble the company about it, he himself had tried to replace the carbon, but finding it a trifle too small, he had wrapped a few turns of paper around it, which made it stay all right. The disgust of Mr. Evans and Jim can be better imagined than described. The latter happened to have a piece of brush copper, which soon took the place of the paper, after which the two left the store, having first telephoned Bert to "start her up." Mr. Evans hurried home, as he had some visitors, while Jim went back to the station, where all three had a good laugh over the storekeeper's well meant attempt at lamp repairing.

"Well, boys, we may laugh at that man's ignorance," sententiously remarked Benson, as he slowly filled his corn-cob pipe, to enjoy a soothing after-supper smoke, "but I know the time, not many years ago, when all of us knew but little about this mysterious fluid. In '89, I think it was, the 'Isabella' was being wired for three arc lamps; one was a big searchlight at the bow, while two were used, one each at her sides, when loading or discharging freight. Of course the white, so-called underwriters' wire was used almost exclusively in those days, and it was when a piece some hundred feet long was stretched along the deck preparatory to being put on the insulators, that an elderly gentleman, accompanied by his wife, was seen to closely watch the operations of the wireman. The old gentleman's curiosity finally induced him to ask the electrician for an explanation of the wonderful Edison light. (Everything was Edison in those days.) The wireman, in as non-technical terms as possible, explained things to the best of his ability, and the passenger seemed to understand it all right, but his better-half evidently had not got things just right, for, pointing to the line of white wire, she asked:

"'Yes, I understand about the lamps and that dynamo down below, but I don't believe that long wick can ever suck up enough oil all the way from the engine-room!'"

"Ha, ha, ha!" laughed Jim and Bert.

"But I believe it," added Jim, "it's just like that secretary of the Imperial Company at Emporia. I'll tell you a story on him as soon as I come back from a little engagement I have. I'll step in at Dick Harlow's and ask him to stay a few hours for me. So long."

President Vreeland, of the Metropolitan Street Railway Company, New York city, expects to have the Fourth avenue electric line ready for traffic down Centre street to the Brooklyn Bridge by March 1.

TELEPHONE NEWS AND COMMENT.

The Southern Bell Telephone Company will expend about $20,000 in making improvements to its building and exchange in Birmingham, Ala.

The board of directors of the Direct United States Cable Company, at their January meeting in London, England, voted all their employés a bonus of five per cent on their yearly incomes.

The report of the Wisconsin Telephone Company shows: Gross receipts, $434,768.74; taxes, $13,043.06. The company reports that it has 17,803 miles of wire in operation, and 10,027 instruments in use.

At the annual meeting of the Saratoga, N. Y., Adirondack & Lake George Telegraph Company the following officers were elected: President, W. West Durant, New York city; vice-president, H. G. Young, Albany; secretary and treasurer, J. W. Burdick, Albany; general manager, W. C. Humstone, New York city.

The Union Telephone Company, of Portland, Me., has been organized for the purpose of acquiring and operating telephone lines, and dealing in telephone and electrical supplies. The papers of incorporation call for a $10,000,000 capital stock, of which $300,000 is paid in. The officers are: President, Frederick H. Gorman, of New York city; treasurer, George A. Beaton, of Detroit, Mich.

The Central Union Telephone Company, of Indianapolis, Ind., have prepared a little pamphlet entitled "Some Facts," containing expressions of opinion from numerous business men in their territory as to the question of two telephone services in the same town. The majority of opinions, as here expressed, is decidedly against two telephone companies seeking to serve the same patrons.

The Newark, N. J., Telephone Company has re-elected the following officers: President, John M. Gwinnell; secretary, James F. Connelly; treasurer, Samuel Klotz; directors, John M. Gwinnell, Timothy W. Lord, George W. Wiedenmayer, Charles B. Smith, Samuel Klotz, Bernard Strauss, Theodore C. E. Blanchard, James F. Connelly, P. J. Nevins, Henry Vincent Jackson, L. Eugene Hollister.

A New Line of Small Direct-Current Motors.

The General Electric Company announces a new line of well designed and thoroughly constructed direct-current motors of small capacity adapted to the direct application of power to small machines of all kinds. They have been given the designation of "Type C. A.," and in their design the production of an efficient motor, sufficiently light and compact to allow of installation in cases where space is limited and absolutely rigid support unobtainable, has been kept constantly in view. A magnet circuit, therefore, entirely of laminated iron has been adopted, and greater lightness and compactness thus secured than would have been possible with cast-iron. Furthermore, by the use of laminated iron a uniform magnetic circuit is insured.

High-grade material is used exclusively throughout these motors, and the workmanship is the best. The construction of the armature, commutator and field coils follows closely that in the standard General Electric railway motors. Indeed, every feature of the excellence of the latter has been retained in the "C. A." type. The laminated armature core is toothed and wound with the Eickemeyer type of coil. The leads from the armature are soldered directly into slots in the segments and the field coils are thoroughly taped and mounted on laminated pole pieces. The armature can be withdrawn after taking off the pulley end bearing, and the field coils removed through an opening in the frame. In the larger machines the shaft is mounted on two similar swivel bearings, each self-oiling. The brush holders are adjustable radially, and may be revolved around the commutator if required. The neutral point is very wide, however, and no adjustment of the brush holder is necessary. These motors are enclosed and thoroughly protected from mechanical injury, but thorough ventilation is provided by holes in the bottom of the case and around the commutator end of the armature. Should these motors be used in places where flying dust necessitates extra protection, the commutator and brush holders may also be incased.

The speeds are lower than usual with motors of small capacity; better provision for overload is thus given and losses are not so great. The regulation, efficiency and disposition of the material in the "C. A." motors also combine to give them a continued high economy. Heating tests show that they will run continuously with but slight increase in temperature, and even with a momentary overload of 100 per cent little or no sparking is noticeable. In cases where a number of these motors are required to meet special conditions, the standard construction and wiring is susceptible of modification.

No rails are necessary with this motor. This belt is tightened by moving the motor on the lag screws, which pass through elongated holes in the feet of the frame and hold the motor in place.

One feature of advantage which this motor has over others is the possibility of placing it in almost any position with no greater change than the turning of the bearings to suit the position selected. The "C. A." motor may be installed on the floor or be suspended from the ceiling, be set on a shelf or attached to the wall. In every case the oil cellar is at the bottom of the bearing.

The one horse-power and one-half horse-power "C. A." motors are designed for 115, 230 and 500-volt circuits; the one-eighth horse-power for 115-volt circuits. The floor space for the first named is only 22⅛ inches by 16½ inches, and for the one-half horse-power motor 18¾ inches by 13 inches. The motors are finished in black, with brush holders and small parts nickeled and polished.

For use with the two larger sizes a new type of rheostat has been developed. It is provided with an automatic switch, which breaks the circuit in case of overload and effectually protects the motor armature. The smaller size are series wound and require no rheostat.

FIG. 1.—DIRECT-CURRENT STATIONARY MOTOR, TYPE "C A"—1 H.-P.

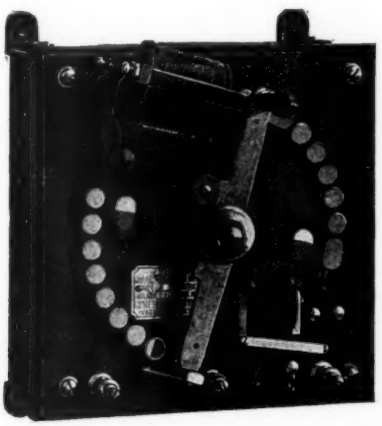


FIG. 4.—AUTOMATIC STARTING RHEOSTAT.

FIG. 2.—DIRECT-CURRENT STATIONARY MOTOR, TYPE "C A"—½ H.-P.

FIG. 3.—DIRECT-CURRENT STATIONARY MOTOR, TYPE "C A"—⅛ H.-P.

COMMENTS ON THE "ELECTRICAL REVIEW."

"A WELCOME VISITOR TO THE STATION MAN."

TO THE EDITOR OF ELECTRICAL REVIEW:

I find your journal very instructive, and the absence of intricate formula renders it a welcome visitor to the ordinary station man.

W. F. MURPHY.

February 10.

"BEST."

TO THE EDITOR OF ELECTRICAL REVIEW:

I decidedly dislike to praise you, knowing your frailties, but the ELECTRICAL REVIEW is far ahead of all its competitors and the best electrical journal in this country.

Very truly yours,

F. Z. M.

New York, Feb. 14.

A HANDIER FORM.

[*From Lightning, London.*]

With the first number of the New Year my contemporary, the *Electrical Review*, of New York, has altered its shape, the columns being considerably shorter than before, though the page remains of the same width. There is naturally an increase in the number of pages. No remark is made on the subject in the journal itself beyond the line, "What do you think of the change?" Being thus asked, I reply that I congratulate the *Review* on having adopted a much handier form than the old, though at the same time their title heading has not been changed for the better.

New York Electrical Society.

The 185th meeting of the New York Electrical Society, in conjunction with the New York section of the American Chemical Society, was held at the College of the City of New York, on February 11. Mr. Joseph Wetzler lectured on "Electricity direct from Carbon." Dr. Chas. F. Chandler, Dr. Morris Loeb, Dr. C. A. Doremus, and Messrs. Samuel V. Essick, C. O. Mailloux, J. J. Carty, T. C. Martin and Max Osterberg took part in the discussion. The following members were elected: Prof. Robert Ogden Doremus, Max. Loewenthal, James H. Bates, Raymond W. Charles, W L. Hedenberg, Frank Martin, F. A. Pattison, Geo. C. Hoffman, Thorburn Reid, Robert Lozier, Prof. Sidney H. Short, Geo. Sommer, John J. Swann, Meyer S. Blumberg, Frederick W. Young, Wesley Gray Gilmour, Edwin Adelbert Howe and H. F. Sanville.

ELECTRIC LIGHTING FOR PROFIT.*

BY ALEX DOW.

(*Concluded from page 108.*)

In these days of competition this subject becomes of the greatest importance. We have against us in every station some competition. In the larger cities we have to meet the offers of opposition companies doing a similar business to ourselves; the arguments of the man who wants to sell isolated electric plants to our best customers; and the ever present cheap service offered by the Gas Company. In the smaller towns and villages the worst obstacle to the holding of business is the tendency of our customers to economize by cutting down the amount of light used. This tendency is present also in the large cities, but is not so constantly in evidence, because many city people must use light liberally in order to carry on their business. The whole law and gospel of holding business consists in getting your customers to believe that they receive good value for their money. It is not sufficient that you should believe it; you must convince the customers. But it tends to make your success more certain if you know in your own mind that you really are giving good value. For this reason it is essential that you know what each block of lighting costs; which brings up again the subject of analysis of expenses.

No matter how cheaply you offer to sell your products, it is essential that the customer is satisfied with what is delivered to him. Therefore, if he wants to use arc lights, you must see that they are quiet and steady. If he buys current from you wherewith to operate a motor, you must make it your business to see that his motor runs satisfactorily. It is not a part of your contract to do this, but if the motor does not run as it should, you will go up there some day and find that he has bought a gas engine. If you sell him current for incandescent lighting, you must see that the lamps are renewed before they become dim. If you can not get the customer to buy new lamps, you had better arrange to furnish renewals free, as most stations now do. If, even then, your customer is slow about calling for renewals, you had better send one of your men up to change the lamps. Neglect in this respect probably means that there will be a sale of Welsbach burners in the neighborhood of that customer. You must be prepared to send assistance to him when he mixes things so that fuses get blown, and you must send this assistance promptly. This may mean that a man has to idle around the station waiting for trouble calls, but you should not think that man's idleness gives you a chance to economize by discharging him. You should look upon it as the outward and visible sign that your customers are getting good service. And above all, you must take such precautions that your service may be relied upon by all who employ it. There is nothing that does so much to damage the business of a station as a reputation for unreliability.

In closing, I wish to say that I am preaching no doctrine which I do not believe, or which I do not try to follow. Neither do I imagine that the stations represented in this Association are less carefully planned, or less efficiently managed than those of the rest of creation, that I should address myself to you rather than to others. But it is by electric light men and no others that the advice must be given to those who need it. And each of us has the opportunity at some time to counsel with the man in the next town of whom we have been speaking. While I was in the act of preparing this paper, I was asked for advice in just such a case, and gave verbally just the same advice that I was putting in writing for presentation to you.

This is a final summary of the opinions I have presented: (1) The electric lighting business should pay, as a reasonable profit, approximately the same rate as any manufacturing business which has similar risks. This profit should be paid after the expenses of operation, maintenance, and depreciation, shown by annual inventory, have been provided for. (2) Rates for electric supply should be so adjusted that each unit sold will pay its share of operating and standing charges, and in addition thereto a uniform proportion towards profit. No business should be done at a loss, and no business should pay more towards profit than its proper share. 3. Every class of business that can be profitably done should be obtained. Business that improves the load factor should be taken if it can be obtained at any price greater than its share of operating and standing charges, because the improvement of the load factor reduces the amount of standing charges to be borne by existing load. 4. Business once obtained should be kept by careful study of and prompt attention to the requirements of each customer. It is not possible in the present stage of electric development for an American electricity supply company to limit its interest in the supply to its delivery on the customer's premises. It must do much work in order to secure that the customer uses the supply to the best advantage.

It is not sufficient that a customer should be well served; he must also be well pleased. 5. There is need of educational work to be done among electric light men, among municipal authorities and municipal theorists, and among our own customers. It is our interest that this educational work should be done, and as it does not appear to be the duty of any other person to do the work, we will have to do it ourselves.

* Read before Northwestern Electrical Association, Milwaukee, January 19, 1898.

LATE NEWS.

The Armour Electric Light, Fuel and Power Company, of Chicago, Ill., certified to a change of name to the Alaska Company.

The Barnesville, Ohio, Telephone Company has sold its business and contracts to the Central District and Printing Telegraph Company, of Pittsburgh. Barnesville expects soon to have long-distance connection.

The Hudson Subway Company, of New York city, has been incorporated to construct and maintain subways or tunnels to hold pneumatic tubes, gas and water pipes, telephone and telegraph wires and cables. The capital is $5,000 and the directors are Thomas F. Lennon, of the borough of Richmond, and Thomas F. Farrell and Walton I. Aims, of the borough of Manhattan.

How to Become an Electrical Engineer.

In response to a popular demand the ELECTRICAL REVIEW has collected in a neat pamphlet of pocket size, the essays which won prizes in its recent contest for the best advice as to "How to Become an Electrical Engineer." The pamphlet also contains a list of colleges in the United States having courses in electrical engineering, giving, where possible, the name of the professor in charge of the electrical department. The pamphlet will be sent, postage free, on receipt of price, 25 cents, by the ELECTRICAL REVIEW Publishing Company, Times Building, New York.

The Westport, Ct., & Saugatuck Street Railway has been sold to a Mr. Tomlinson, a New York capitalist.

OBITUARY.

J. H. RHOTEHAMEL.

J. H. Rhotehamel, president of the Columbia Incandescent Lamp Company, of St. Louis, died suddenly at his home in St. Louis, on February 17. Mr. Rhotehamel, who had not been in robust health for some months, went to Hot Springs, Ark., with his family about February 1, for rest and treatment. He became seriously ill after beginning the treatment, though no alarm was felt that his death was imminent. His family was advised to take him home and he arrived in St. Louis on February 16. The following day his death occurred from congestion of the brain. The funeral services were held last Saturday and were largely attended.

Mr. Rhotehamel was a business man of ability and aggressive methods. It was due to his energy and talent that the famous Goebel incandescent lamp litigation was instituted and brought to a termination favorable to his company. There were few manufacturers of incandescent lamps better informed as to the underlying principles and details of the lamp business than Mr. Rhotehamel. The ELECTRICAL REVIEW extends its sympathy to his family and associates in their loss.

Henry Ward Johns, president of the H. W. Johns Manufacturing Company, of New York city, and of the Johns-Pratt company, of Hartford, Ct., died on February 8 at his home in Yonkers, N. Y., after an illness of several months. Mr. Johns was born in Massachusetts in 1837, and years ago, while experimenting with a view to perfecting a fireproof compound, his attention was attracted to asbestos, which was at that time little known outside of laboratories and mineralogical collections. From that time on his abilities had been devoted to developing the manufacture and use of various asbestos compounds, and he had built up a business of great magnitude, based on his numerous inventions.

John E. Ridall died at his home in Pittsburgh on February 8 of pneumonia. He was born in 1850 and was one of the early pioneers in the electrical business, which he entered in 1880 as the head of the firm of Ridall & Ingold, special agents for Western Pennsylvania of the Brush Electric Company. Since 1884 he has been sole agent of the Brush company, and has been closely identified with the history of electrical development in Pittsburgh. He was one of the organizers of the Allegheny County Light Company in 1881. Mr. Ridall's death will be mourned by a wide circle of friends.

The Deming Electric Pumps.

In the accompanying illustrations are shown three types of electric pumps manufactured by the Deming Company, of Salem, Ohio, whose general Western agents are Henion & Hubbell, 61 North Jefferson street, Chicago. In Fig. 1 is shown the Deming triplex electric pump for general service. It is constructed for 150 pounds working pressure, and is especially valuable for use in connection with motors where the power is metered and the highest obtainable efficiency is required. This type of pump is especially adapted for apartment house, hydraulic elevator, water-works, brewery, refinery and mine services. It is furnished complete with intermediate gearing, rawhide pinion and heavy motor base for any type of motor. The Deming Company will also furnish motors if required.

FIG. 1.—THE DEMING TRIPLEX ELECTRIC PUMP FOR GENERAL SERVICE.

In Fig. 2 is shown the Deming triplex electric air compressor for pressures up to five atmospheres. It is designed to meet the requirements of house service, in the transmission of messages, or signals by the pneumatic system, or the operation of automatic heat-regulating systems. The construction of the apparatus is of a high grade of excellence and the compressor can be run in club and apartment buildings with entire freedom from annoying sounds. It is valuable in cramped situations for operating drawbridges and locking and signal apparatus. It is supplied with a sub-base, idler and belt, and with an electric motor if desired.

The Deming portable triplex electric mine pump is illustrated in Fig. 3. It is built for 150 pounds working pressure, has steel crank shafts, brass bearings and cut gears. The plungers are not only outside packed, but outside guided—a feature that in gritty, acid or sulphurous waters doubles the life of the pump. The gearing is carefully guarded and the suction and discharge are from either side of the pump. The mountings are furnished of either timber or iron for any gauge of track or height of working.

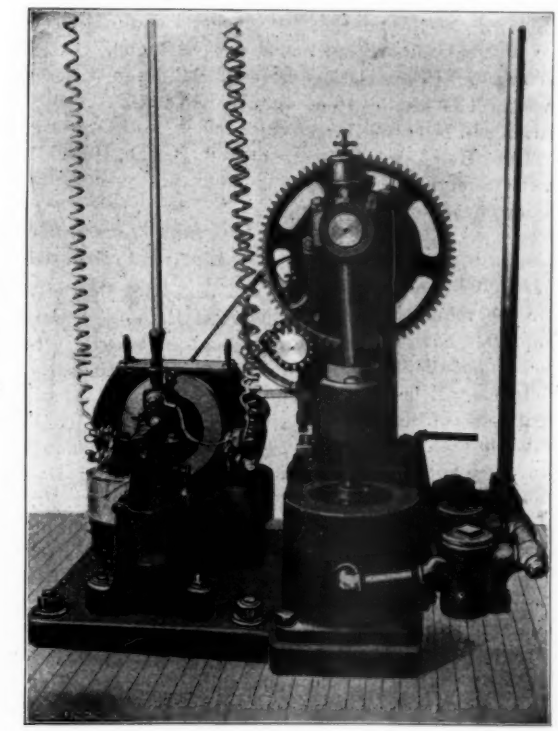


FIG. 2.—THE DEMING TRIPLEX ELECTRIC AIR COMPRESSOR.

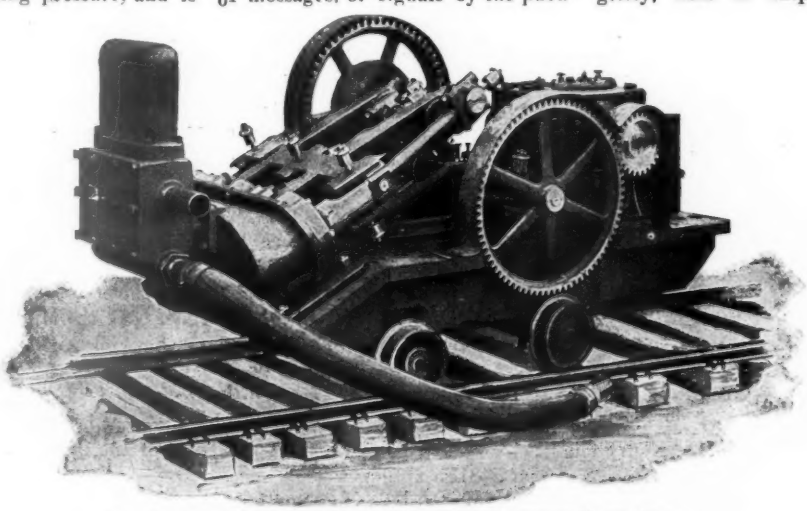


FIG. 3.—THE DEMING PORTABLE TRIPLEX ELECTRIC MINE PUMP.

Cummings's Underground Conduit and Conductor System.

Mr. James F. Cummings, president of the Armorite Interior Conduit Company, Pittsburgh, who is well known throughout the electrical industry, informs the ELECTRICAL REVIEW that he is retiring from the active management of the Armorite Company and will devote his whole time to pushing his new conduit and conductor system, just perfected, for underground work. Mr. Cummings states that he is as much interested in the Armorite Company now as in the past, but can not spare the necessary time to look after details. The new underground system will be placed on the market within a short time.

Star Electric Company's Officers.

At a recent meeting of the stockholders of the Star Electric Company, of Binghamton, N. Y., the following board of directors was elected: George S. Beach, C. E. Beach, H. W. Doughty and S. H. Chase. At the adjourned annual meeting of the directors, held on February 16, the following officers were elected: President, George S. Beach; secretary and general manager, C. E. Beach; treasurer, H. W. Doughty.

Williamsport, Md., will ask the legislature for authority to issue $20,000 in bonds to erect a municipal electric lighting plant.

American Street Railway Association.

The seventeenth annual meeting of the American Street Railway Association will be held at the Massachusetts Charitable Mechanics' Association Hall, Boston, Mass., on September 6, 7, 8 and 9, 1898. It is expected that the largest exhibit of railway appliances ever shown to this association will be on view. The headquarters of the association will be at the Hotel Brunswick. The Hotel Vendome, being under the same management, will be used in connection with the Brunswick.

Railroad rates will, in all probability, be as heretofore—one and one-third fare for the round trip. The executive committee advises all who desire hotel accommodations to apply at once. No rooms will be assigned in the principal hotels of Boston until March 15, but will then be assigned in the order in which applications are received. The annual dinner will be held at the Hotel Brunswick, Thursday evening, September 8.

Secretary Penington announces that papers will be read on the following subjects: "Maintenance and Equipment of Electric Cars for Street Railways," "To What Extent Should Street Railway Companies Engage in the Amusement Business," "Underground Electric Roads—Construction and Management," "Carrying of United States Mail on Street Railways," "Comparative Earnings and Economy of Operation between Single and Double Truck Cars for City Use," "How to Care for Return Current," "Inspection and Testing of Motors and Car Equipment by Street Railway Companies."

Municipal Electric Light and Power Plants in Germany.

James T. Du Bois, United States Consul-General at St. Gall, informs the State Department that in the following cities in the German Empire the municipal authorities own and manage the electric works that supply light and power: Bremen, Barmen, Cassel, Darmstadt, Düsseldorf, Elberfeld, Hanover, Cologne, Königsburg, Lübeck and Pforzheim. All of these cities, with the exception of Hanover, also own the gasworks. The following cities have constructed the electric works for the purposes of light and power, but have leased the management of the same to private operators: Aix la Chapelle, Chemnitz, Frankfort, Strasburg and Stuttgart, all of which, with the exception of Chemnitz, are cities where the gasworks are under the management of private corporations. In the following cities private companies have established electric works with the agreement that, under certain conditions, the municipal authorities shall have the privilege of securing absolute control and ownership by purchase: Altoona, Dessau, Gera, Hagen, Heilbronn, Leipsic, Mülhausen, Stettin and Zwickau. Of these cities the gasworks are under private control in Dessau, Hagen, Mülhausen and Zwickau.

A Telegraph Tournament at the Electrical Exposition.

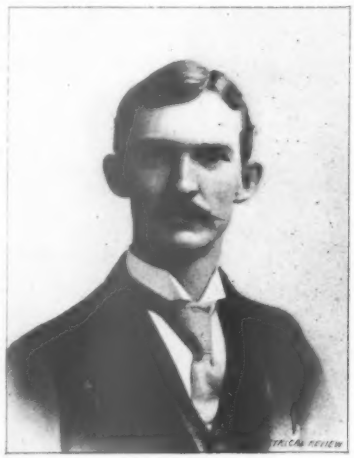
The Auxiliary Committee of the Electrical Exhibition Company has arranged for a telegraph tournament to be held during the electrical exhibition at Madison Square Garden, New York, in May. Mr. Fred Catlin has been secured to conduct the tournament. Mr. James D. Reid, the "father of the telegraph," who is well known to every operator the world over, has consented to act as chairman of the board of judges. Mr. J. B. Taltavall, a member of the Auxiliary Committee, will also assist in looking after the interests of the telegraph operators. Mr. Catlin is determined to make this tournament the most successful of the kind ever held. The prizes will be liberal and the contests numerous. There will be ample opportunity for the younger operators, and it is expected that many records will be broken. The exact dates of the contests have not yet been determined. Handsome medals will be awarded to the winners, in addition to cash prizes. Mr. Catlin will, as soon as possible, issue a circular for the information of operators who desire to take part in the contests. This circular will contain records of the past tournaments and the necessary information about the one to be held in May.

Hartford Electric Light Company.

The stockholders of the Hartford, Ct., Electric Light Company, at the annual meeting, re-elected the following directors: A. C. Dunham, W. H. Bulkeley, W. O. Burr, Atwood Collins, E. B. Bennett, Henry Roberts, Rodney Dennis, D. M. Barney, E. K. Root, Lucius F. Robinson, W. L. Robb and W. F. Henney. The directors met and re-elected officers as follows: President, A. C. Dunham; vice-president, E. B. Bennett; treasurer, D. N. Barney; secretary, D. P. Colton; auditor, George H. Gilman.

Oliver Blackburn Shallenberger.

The recent death of Mr. O. B. Shallenberger and his achievements in the electrical field call for a more extensive notice of his career than was possible at the time of his demise. He was born at Rochester, Pa., in 1860. In 1877 he entered the United States Naval Academy as a cadet. From the very start he took a leading position in his class, and at this early date displayed that remarkable judgment which was such a large factor in his success. About this time Prof. N. M. Terry had begun to develop that excellent course in physics, which has added so much to



OLIVER BLACKBURN SHALLENBERGER.

the reputation of the Naval Academy, and Mr. Shallenberger had no sooner entered upon that study than he began to take a special interest in the branch of electricity. His inclination from the first was toward original and experimental work. Mr. Shallenberger's course at the Naval Academy was contemporary with that of Duncan, Sprague, Hasson, Wilkes, and several others whose names are well known among electricians. After his graduation in 1881 he made a cruise in the Mediterranean; he returned to the United States in 1883 and resigned from the naval service the following year in order to give his whole attention to the science of electricity.

In 1884 he became connected with the Union Switch and Signal Company, of Pittsburgh, as assistant in its newly organized electric light department. His ability was at once apparent, and the following Summer he was selected to take charge of the setting up and operation of the Gaulard & Gibbs apparatus, imported from Europe by Mr. Westinghouse, at which time his practical acquaintance with alternating currents began. After Stanley's experiments at Great Barrington, Mass., and other experiments conducted at Pittsburgh by Mr. Shallenberger, the alternating-current system was adopted, the Westinghouse company was organized and he was appointed chief electrician.

Mr. Shallenberger was one of the earliest to apply the theories then known about alternating currents to practical operation. In all his work he mingled his brain with his labor. He was the first in America to succeed in coupling alternating-current generators in multiple. The system used for incandescent street lamps in series with a shunt of high self-induction around each lamp was one of his early inventions. Probably his most beautiful conceptions are exhibited in his electrical measuring instruments.

In 1891 Mr. Shallenberger was obliged to go to Colorado Springs on account of ill-health, where he had since spent his Winters, coming East to his home and laboratory in Rochester only during the Summer months. In the early part of 1897 Mr. Shallenberger organized the Colorado Electric Power Company. He was the president of this company, and acted as consulting engineer for the Westinghouse Electric and Manufacturing Company. He last left the East for Colorado in the latter part of October, 1897.

LITERARY.

In the March number of *McClure's*, Herbert E. Hamblen will relate the story of his own experiences as a freight engineer. That the story will abound in interesting and strange adventure we may safely infer from the account he has already given in *McClure's* of his experiences as a fireman and a brakeman. The paper will be illustrated with drawings from life by W. D. Stevens.

A Spanish-Cuban Cable.

A cable dispatch from Madrid states that the Ministry of the Interior has approved the laying of a submarine telegraphic cable between Spain and Havana, Cuba. The scheme has been referred to the Ministry of the Colonies.

New York Edison Company's Earnings.

The earnings for January of the Edison Electric Illuminating Company of New York, including the high-tension systems, were as follows:

	1898.	1897.	Inc.
Gross	$298,307 36	$240,299 05	$58,008 31
Net	147,889 22	124,543 50	23,345 72

TRADE NOTES OF INTEREST.

S. R. Jonap & Company, Eighth avenue and Twenty-fourth street, New York city, have installed in their store 76 standard Bergmann enclosed arc lamps, made by the General Incandescent Arc Light Company, of New York.

The Massachusetts Gas and Electric Light Commissioners have approved an issue of $33,000 bonds for the Somerville Gas and Electric Light Company. The hearing on the petition of the Dedham & Hyde Park Gas and Electric Light Company for the issue of $60,000 bonds has been adjourned until February 24, at two o'clock.

Mr. A. T. Brennan, general manager of the Newark, Ohio, Telephone Company, spent a few days in Chicago a week ago, arranging for an increase in his company's equipment. Mr. Brennan is one of the few telephone managers who met with success from the start, and will hereafter be still better equipped to give good telephone service.

The new 800-line exchange equipment recently installed in Kalamazoo, Mich., by the American Electric Telephone Company, is now complete and works to perfection. The local company is especially well pleased with the rapid manner in which the work was done, without interfering in the slightest with the service.

Mr. H. W. Wiswell, who for several years has been connected with the transformer department of the General Electric Company, has resigned, to accept a position with the New York & Ohio Company as electrical engineer. Although quite young, Mr. Wiswell's comparatively long experience in this particular branch exceptionally fits him for his new duties. Mr. H. W. Wiswell is a son of the mining engineer and inventor of that name. Both the New York & Ohio Company and Mr. Wiswell are to be congratulated.

The Boston Gas Light Company are erecting a new gas plant at Commercial Point, in the vicinity of Boston. This new plant consists of a building about 52 feet wide and 185 feet long, having brick side walls and brick partition walls, dividing the building into three distinct parts, made up of a generating-room, blower-room and condenser-room. No wood is used in the construction of the building, and it is absolutely fireproof. The floors are of steel throughout. The roof is covered with slate, supported on steel roof trusses and framing. The contract for furnishing and erecting the steel roof work complete has been let to the Berlin Iron Bridge Company, of East Berlin, Ct.

The Standard Light and Power Company, of Dallas, Tex., has placed an order with the Walker Company for two alternators, one of 225 and the other of 325 kilowatts capacity. They are to be direct connected to "Erie" engines and are designed to run at 125 revolutions per minute. The current will be two phase and 60 cycles. In addition to these the Walker Company will furnish them with two direct-connected railway generators of 225 and 325 kilowatts capacity, respectively. Two alternating generators of 250 kilowatts capacity each are being built for the North River Electric Light and Power Company, of New York city. They are to be of the belted type. Townsend, Reed & Company, of St. Louis, have purchased for the St. Louis, Belleville & Suburban Electric Railway two 200 kilowatt direct-connected Walker railway generators, besides eight double 10 S railway equipments with "S" controllers. On the other side of the Atlantic the Glasgow Municipal Tramway will place a number of Walker motors on its cars at an early date, while the electric railway of Alexandria, Egypt, will increase its present Walker plant by the addition of one 150-kilowatt belted generator with switchboard, and four double 3-N equipments.

The new direct-current stationary motor of the General Electric Company was exhibited at the recent Milwaukee convention. This motor is designed to meet the increasing demand for small sizes of motors, and is constructed for any voltage ranging in size from one-eighth to one horse-power capacity. This motor has been designed to produce the highest efficiency, due regard being made to construction as to weight and compactness, where space is limited and rigid support unobtainable, by the adoption of magnetic circuit of laminated iron; thus the weight has been materially reduced over that of cast-iron. The ventilation has received special attention with marked degree of success. Heating tests show that with 50 per cent overload for one hour, no sparking is noticeable, and rise of temperature is almost imperceptible. A momentary overload is possible with little sparking. The motor can be placed in any position, either on the wall, floor or ceiling, and runs noiseless with the highest degree of economy. The rheostat, with which the motor is controlled, is of the automatic overload attachment type, which breaks the circuit and prevents the burning out of the armature.

Electric Lighted Buoys.

The annual report of the United States Lighthouse Board to the Secretary of the Treasury for the fiscal year ended June 30, 1897, has just been issued. The electric buoys used in New York Bay are referred to as follows:

The system of marking the Gedney, Bayside Range Cut and Chapel Hill Range Cut channels, New York Lower Bay, with buoys lighted by electricity through submarine cables leading from Sandy Hook, is in successful operation, and continues to give satisfaction. The six old or direct-current system of electric buoys, lighted by iron-armored, triple-conductor cables, to mark the Gedney Channel, were permanently discontinued, and the buoys taken up November 11, 1896. The electric buoy No. 12, at Southwest Spit, has a circuit of its own—part of the old system—which will be retained during the lifetime of the present cable. (An extension of this cable will light the Chapel Hill Range Cut Channel; electric buoy placed June 14, 1897.) The use of switches in the heads of buoys, applied, tentatively, in the early part of the present year with a view to isolate defects in particular buoys, has not succeeded to the extent desired, due to inability, so far, to make them perfectly watertight. They will be discontinued for the present and until the defect is overcome by improvement or change. The principal causes of failure in submarine cables for the operation of electric lights are now reduced to two; namely, the action of ice moving in heavy fields, which submerges the buoys, and the collision or fouling of passing vessels, which, by breaking the connection, extinguishes the lights. The collision of vessels, however, as a disturbing element, is growing less frequent, owing to a better knowledge on the part of mariners enlightened by notices and requests published by the Lighthouse Establishment of the location of the cables and of the risks to themselves involved in fouling them. The adoption, last year, of a terminal "fork" or divergent ends running to the two lines of buoys instead of the loop which had previously fed them had the effect, several times, of preventing the lights on both sides of Gedney Channel from being out at the same time. The failures incidental to a system of buoys lighted with electric lamps, such as grounds, imperfect splicing and defects inherent in the buoys, lamps, transformers and cables, were reduced to a minimum by skill in the inspection and superintendence, the constant service of the tenders and the watchfulness and care of the keepers in charge of the plant at the station on Sandy Hook. The advantages of the new system of electric buoyage over the old are established and made manifest in the economy of cost and maintenance, and in the facilities for handling, repairing and installing afforded by the materials employed.

The weather during the past Winter was very cold in short spells, with long intervals of moderate temperature between them. The action of floating ice was not, therefore, as constant or detrimental as it was in several previous years. In consequence, the lights of the electric buoys, although frequently extinguished for a short period at a time, were more effective than usual throughout the year.

There were many times during the year when slight "grounds" caused the lights to burn low. On two days in January, 1897, the whole system was extinguished for a few hours each day, due to submergence of the buoys by ice. In February all the lights were out for six nights. In April they were out two nights, and in May four. Seventeen new buoys in all were put down, nine to replace those burned out at the heads, or otherwise damaged by electrical action, and eight in place of buoys destroyed by collisions of passing vessels.

Gratuitous Advice to an Electrical Engineer.

A good story on a well known electrical engineer is going the rounds among the "boys" in Chicago, and as it is absolutely true, will be all the more appreciated. The gentleman in question had occasion to visit St. Louis recently to figure on the wiring of a large factory. Towards evening of the first day he asked the clerk of the ——— hotel, where he had registered earlier in the day, to have him shown to a room, so that he might clean up a bit before dinner. "Front!" shouted the man with the 1,200 candle-power diamond, "show the gentleman to No. 374." "Front" duly led the way, and arriving at the room, turned on the electrolier, deposited Mr. X's valise on the floor, and giving our friend a rather critical look, said: "Say, Mister, when you wants to turn out the light, you just give this button a turn to the right."

ADVANCE INFORMATION

New Incorporations.

INDIANAPOLIS, IND.—The American District Telegraph Company, of Indiana, for furnishing police patrol system, messenger, fire-alarm system and other service of similar kind, has been incorporated. The offices will be in this city. The directors are H. D. Bennett, John F. Wallick, W. F. Burdette, J. F. Miller and H. W. Bennett.

COLORADO SPRINGS, COLO.—Articles of incorporation for the Colorado Messenger and Signal Company have been filed. The incorporators are M. A. Leddy, Frank W. Howbert and Belvidere Brooks. The object is to erect in towns of El Paso County lines and wires for transmitting fire-alarms, police, messenger and other signals; to maintain telegraph lines, sell electrical machinery, etc.; the capital stock is $60,000. The directors for the first year are M. A. Leddy, B. Brooks, Frank W. Howbert, John J. Dickey, L. N. Stevens, John A. Voorhees and R. C. Clowry. Mr. Dickey is the western superintendent of the Western Union Telegraph Company, with headquarters at Omaha, and Mr. Clowry, of Chicago, is general manager of the Western Union.

OMAHA, NEB.—The Western Electrical Company has been incorporated, with a capital stock of $10,000. The incorporators are E. G. McGilton, G. W. Johnston and Lawrence Rath.

ST. LOUIS, MO.—The Mississippi Valley Electrical and Manufacturing Company has been incorporated, with a capital stock of $100,000. Incorporators: J. R. Farmer, Edward Buder, Eugene Buder and A. F. Ittner.

CINCINNATI, OHIO — The Cincinnati Delivery, Power and Refrigerating Company has been incorporated with $250,000 capital stock. The company proposes to build a system of underground pneumatic pipes for supplying compressed air to consumers, also for transmitting letters, parcels and anything movable, either by compressed air or electricity. The incorporators are Guy M. Gest, Edmund Wisnewski, James H. Woodard, Herman J. Groesbeck and Bert L. Baldwin.

WORCESTER, MASS.—New England Electric Railroad Construction Company has been incorporated. E. E. Carpenter, president; H. F. Leland, treasurer; capital, $25,000.

Electric Light and Power.

TORONTO, ONT. — The Allcock, Laight & Westwood Company has been incorporated; capital, $30,000.

TORONTO, ONT.—The Saugeen Electric Light and Power Company has been incorporated; capital, $20,000, in $10 shares.

ELGIN, TEX.—Mr. L. L. Pucket, of this place, is contemplating putting in an electric light plant.

DENVER, COLO.—The articles of incorporation of the Needle Mountain Electric and Power Company, with a capital stock of $200,000, to operate in La Plata County, have been filed with the secretary of state by L. B. Jordan, John Lawsen and G. F. Carris.

GAINESVILLE, GA. — Charles S. Webb is at the head of a company that will operate a number of electric lights here.

HATTIESBURG, MISS. — Dunbar & Son will establish an electric lighting plant.

ATLANTA, GA.—City Clerk may give information concerning erecting and operation of its own electric lighting system.

KANSAS CITY, MO.—Cornelius S. Sweetland and others have been granted franchise to erect and maintain an electric plant for the furnishing of light, heat and power.

BALTIMORE, MD.—The American Heat, Light and Power Company has been incorporated by N. P. Bond and others; capital stock, $100,000.

BRIDGETON, ME.—The Bridgeton Electric Light and Water Power Company is about to place its plant in operation.

WILLIAMSPORT, MD.—The Mayor may be addressed for information concerning construction of electric lighting and heating plants, for which $20,000 in bonds will be issued.

CHARLESTON, S. C.—The Charleston Light and Water Company has made application for charter, for the purpose of constructing lighting and water plants, etc.

ELGIN, TEX.—L. L. Pucket contemplates the construction of an electric light plant.

BROWNSVILLE, TENN.—The Electric Light Company, of this place, has made arrangements to extend their system into the residence portion of the town, to enable parties desiring to use the light to do so. The company is now under the direction of Mr. John Clinton.

New Telephone and Telegraph Companies.

PARIS, KY.—A new telephone exchange is being put in at this place.

VERSAILLES, KY.—The Versailles Telephone Company has been incorporated by Messrs. W. R. Procter, Breck B. Smith, of Versailles, and Charles S. Powell, of Richmond, Ky. The company will put in a local telephone system at once. About 50 subscribers have already been secured.

CANTON, OHIO—The long-distance telephone line connecting Congress Lake, Hartville and Middlebranch has been completed by the Central Union Telephone Company.

FULTON, N. Y.—The Fulton Telephone Company has been incorporated, with a capital stock of $15,000; directors, Lenox Smith and J. P. Whitaker, of New York city; George C. Webb, J. C. Curtis, Francis Stiles and F. A. Sage, of Fulton.

PONTIAC, ILL. — The Livingston County Telephone Company has been incorporated, with a capital of $65,000, to operate a telephone exchange; incorporators, W. E. E. Herron, John S. Murphy, A. M. Legg.

EATON, OHIO — A telephone exchange is to be established at this place.

MANKATO, MINN.—The Mankato Citizens' Telephone Company has been organized, with the following officers: President, Lorin Cray; vice-president, Fred Kronisi; secretary and treasurer, John B. Meagher. The board of directors is made up of the above officers and J. A. James, W. A. Funk, Henry Hanse, H. A. Patterson, J. A. Klein, Ed I. P. Slade, John C. Wise, Jr. The capital stock is $25,000.

HARLAN, KY. — The Mountain Telephone Company has been incorporated, with H. C. Clay, president; Prof. W. C. Clemens, secretary and treasurer, and John B. Hurst, general manager, for the purpose of establishing a telephone system.

PERRYSVILLE, OHIO—The Farmers' Telephone Company has been incorporated, with a capital stock of $3,000.

ORTONVILLE, MINN.—The Interstate Telephone Company has been incorporated, with a capital stock of $5,000.

BEL AIR, MD.—The Crewell Telephone Company has been incorporated by Joseph B. Hanway, John McKee and others; capital stock, $1,200.

INDUSTRIAL NOTES.

The Otto Electric Company, of New York city, has secured the American agency for the Cox thermo-electric generators.

The New Extra B. B. iron box bell, introduced and handled by the Central Electric Company, of Chicago, has proven to be one of the best sellers ever introduced into that branch of the electrical business. Its many new electrical and mechanical features commend it to cautious purchasers.

The Davis & Egan Machine Tool Company, of Cincinnati, Ohio, have received, through their office at Berlin, Germany, orders for a number of their screw machines, lathes, drill presses and shapers from the Electricitats Gesellschaft Helios, of Cologne, and Schuckert & Company, of Nuremberg. Both of these concerns are large builders of electrical equipment.

The Burt Manufacturing Company, of Akron, Ohio, makers of the Cross oil filter, recently received the following strong testimonial from general superintendent Wm. W. Cole, of the West Side Railroad Company, Elmira, N. Y.: "After trying several oil filters at our power station, we find that the Cross filter gave us the best results, and I am entirely satisfied with its work. In fact, after the engineer has placed the oil in the filter, the filter does the rest."

The "Electrical Review" has received the 10th catalogue of the Ward Leonard Electric Company, Bronxville, N. Y., which is devoted to "outlet boxes." The manufacturers announce that the porcelain-lined outlet boxes have become the standard for the best practice of electric wiring work in New York city, and their use is rapidly extending in other large cities. The Ward Leonard company manufactures outlet boxes of every variety and of a special nature when required. The catalogue is a very complete one, and will prove of value to all interested in the subject.

CALIFORNIA RESORTS

are fully described in an illustrated folder just issued by the Michigan Central,

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If you want to learn all about California, its resorts, and how to reach them, address W. H. UNDERWOOD, G. E. P. Agt., 219 Main St., Buffalo, N. Y.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED FEBRUARY 8, 1898.

598,498 Junction box for electric conductors; T. J. Close, Philadelphia, Pa.—A junction box for electric conductors, consisting of a body having openings in the sides thereof, and provided with a flange at its upper edge having a groove therein, and a series of openings outside of said groove, a lid with a series of openings registering with the flange openings and bolts for said openings with locking nuts.

598,508 Automatic electric fire alarm; W. A. Guthrie, Durham, N. C.

598,517 Testing apparatus for electric circuits; E. Heymann, Boston, Mass.

598,540 Construction for dynamo-electric machinery; A. Soames, London, England—A dynamo-electric machine in which the bearings for the armature shaft are retained by castings of type metal or other suitable material in brackets secured to the frame.

598,553 Electric switch; J. M. Anderson, Boston, Mass.—In an electric switch the combination of the following instrumentalities, viz., a base, a stationary contact member secured thereto, a movable contact member co-operating with said stationary contact member, a cover of insulating material comprising a stationary member attached to the base, and a movable member attached to said movable contact member to normally cover the said stationary contact and to uncover the same when the movable contact member is disengaged from the stationary contact member.

598,556 Primary battery cell; F. H. Brown, Chicago, Ill.—In a battery cell, a negative element, composed of an agglomerate of black oxid of manganese plumbago and having a superimposed layer of carbon, and sealed with an insulating material, and having a conductor embedded therein, in combination with a positive element.

598,568 Method of manufacturing rheostats, electric heaters, etc.; H. W. Leonard, New York, N. Y.—A rheostat having in combination a number of separable resistance steps, each step of resistance being of practically the same size and design and the ohms of a series of the steps being tapered progressively, and a common support for the steps of the resistance.

598,580 Trolley head; H. W. Smith, Somerville, Mass.

598,610 Coin-controlled telephone pay station; W. Gray, Hartford, Ct.—In a telephone toll apparatus, in combination, a coil-box having a metallic base, a transmitter mounted in the coil box, a toll box secured to the metallic base of the coil box, a signal sounding device located within the box and mounted on the wall thereof.

598,638 598,640 Electric heater; J. F. McElroy, Albany, N. Y.—An electric heater comprising in combination two overlapping plates adapted to slide relative to each other and provided with insulating edges, means for connecting the plates together, springs arranged between the plates tending to force them apart and a resistance wire wound around the plates

598,639 Electric radiator; J. F. McElroy, Albany, N. Y

598,655 Coin-controlled machine for automatically distributing electric currents; J. W. Dawson, Louisville, Ky.

598,657 Alternating-current dynamo; W. B. Esson, London, England—An armature core-piece provided with orifices for embedding the coil and formed with additional orifices.

598,661 Electric street car trolley; J. T. Himmeger, La Rue, Ohio.

598,679 Means for use in operating electric switches; T. H. Parker, Tettenhall, England.

598,697 Electric arc lamp; S. I. Crain, Cincinnati, Ohio—The combination, in an arc lamp, of a pair of pivoted arms carrying rollers adapted to engage with the upper carbon at or near its point of support and electrical connections between the rollers and the main.

598,715 Automatic electric switch; F. C. Perkins, Buffalo, N. Y.

598,726 Incandescent electric lamp and process of making same; J. C. Fish, Shelby, Ohio—In an electric lamp, in combination, a mount composed of a pair of tubes rigidly braced together, a plate to which the ends of the mounts are fused, and through which the leading-in wires contained in the mount project, said plates being fused to the lamp globe.

ELECTRICAL LIBRARY FOR SALE.

SETS, VOLUMES, NUMBERS

OF ALL ELECTRICAL PERIODICALS, Including

Electrical Review	Journal of the Telegraph
Electrical World	The Telegrapher
Electrical Engineer	The Operator
Western Electrician	Electrical Industries
American Electrician	Electrical Enterprise
The Electrician (London)	Modern Light and Heat
Electrical Review "	Engineering Magazine
Electrical Engineer "	Cassier's Magazine
Street Railway Journal	London Engineering
Street Railway Review	Electricity (N. Y.)
Street Railway Gazette	Electrical Age

and a score of other

American, English, French and German Electrical Periodicals. Also,

TRANSACTIONS of the Am. Inst. Elec. Engs.
JOURNAL of the Inst. Elec. Engrs., London
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1,000 Pamphlets, 500 Standard Works and 200 out-of-date books, all Electrical, will be advertised later.

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MR. JOSEPH LYONS, Electrical Expert and Solicitor, and *MR. GUSTAV BISSING, late Principal Examiner of Electrical Division U. S. Patent Office,* announce the formation of a partnership for the general practice of PATENT LAW, with its offices at the McGill Building, WASHINGTON, D. C.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

EDW. S. DUVALL, Solicitor of Patents, Loan and Trust Bldg., WASHINGTON, D. C.

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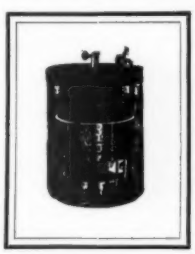

The increasing popularity of the Gordon Primary Cell among the Fire Alarm and Police Signal Service of the leading cities, the railroad, telegraph and telephone companies, and the general adoption of our steel enameled cell for gas-engine, launch and marine service attest most highly to its merit, efficiency, adaptability and economic features.

If you wish to read the testimonials in its behalf, and learn its full description, kindly apply for circular and price list, to

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Every indication points to the most successful show of the kind ever given in America.

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Kindred.... ...Interests

T. H. Brady, New Britain, Ct., the maker of mast arms, hoods and other standard lighting specialties for construction, thinks that every indication points to a very active season.

Eyanson & Armpriester, the well known manufacturing electricians, have removed to the large building on Commerce street, corner of Seventh street, Philadelphia. The company's constantly increasing business has necessitated large quarters, which have been secured at the address given above. The firm will be able to handle more conveniently and promptly the manufacture of its high-grade knife switches, switchboards and tablet boards.

The Solar Carbon and Manufacturing Company, Pittsburgh, Pa., have recently perfected a carbon brush, to be known as "Grade A," which it is thought will prove an advance in carbon brushes. Though the composition of the brush is carbon, it is of greater density than the usual form of carbon, yet does not crumble when heated. The experiments so far made show that it offers less current resistance, wears well at the same time, and keeps the commutator bright.

The Central Electric Company, Chicago, has taken the western agency for the Erickson outlet insulator. This outlet insulator is brought out to meet the demands of engineers for a thorough and perfect protection at the ends of iron-armored conduit outlets. It very effectually and thoroughly prevents possible grounding of the wires on the iron conduits, and has met with a very ready sale. This company is also carrying complete stocks of Insulac and Armalac, for the insulation of generators, motors, and all kinds of high-potential work. These two compounds are fast establishing a reputation for permanency and absolute reliability.

The new desk and ceiling fans, which are being manufactured by D. L. Bates & Brother, of Dayton, Ohio, show a great improvement over any they have previously placed on the market. By the use of oxidized copper in finishing the metal parts of the fan, a much more elaborate and handsome result is obtained than was possible by the old method of japanning. The fans are wound for almost any voltage, and the current consumption being but .5 ampere, any current sufficing for a 16-candle-power incandescent lamp would be sufficient for operating the fan. Self-oiling bearings insure noiseless operation, and, by a rheostat at the base, the fan is regulated to three rates of speed, ranging from 1,000 to 1,800 revolutions per minute, as may be desired.

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A complete street lighting plant to operate 250 24-C.-P. Series Incandescent lamps, consisting of one 12x12 Ideal Engine, nearly new; one I. B. Davis Pump, No. 2; one Berryman Heater, 150 H.-P.; two Mather Series-Wound Dynamos, Capacity 125 24-C.-P. Lamps, each, together with shafting, pulleys, switchboard, etc., will be sold in whole or in part; also two 125-H.-P. Westinghouse Automatic Engines, in use less than a year; one 75-H.-P. Westinghouse Junior Engine, in use less than a year; one Horizontal, 14x42 Corliss, 75 H.-P., in good order. The above will be sold at a bargain, as the Company have no further use for same. Address

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are made in all styles and grades and are just the thing for TIME PLANTS for FACTORIES, SCHOOLS and PUBLIC BUILDINGS. Our specialty is everything electrical in connection with clocks. We make PROGRAM clocks, TIME SWITCHES, MASTER clocks, ELECTRIC clocks, CALENDAR clocks and SIXTY-DAY clocks.

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Telephone Users (INTENDING)

are reminded that the next quarterly issue of the TELEPHONE DIRECTORY will go to press on March 1st. To obtain the advantage of listing in this issue of the directory it will be necessary to make contracts during the present month.

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actually reduces oil bills 50 per cent. or more. Sent on approval. Capacities ranging from 3 to 120 gals. per day. Used in 17 countries. It is specially adapted to Electric Light and Power Plants. Established eight successful years.

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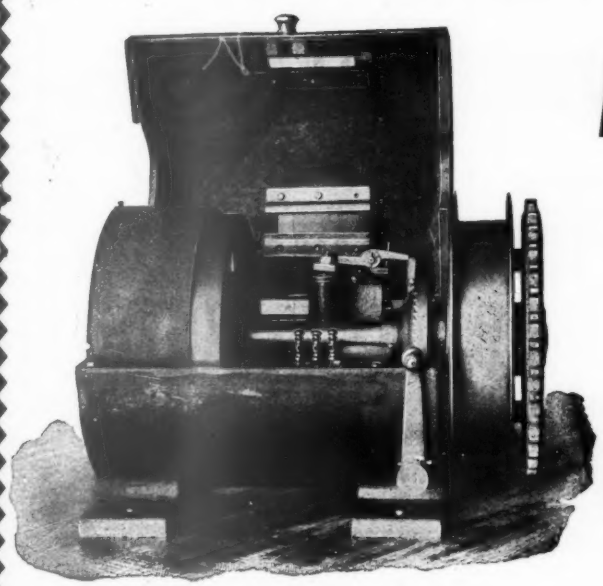

THE MONARCH ENGINE-STOP. Interior View.

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No Connection with the Governor

WE CLOSE THE THROTTLE

Especially is this Device INDISPENSABLE to the Engines of

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IT IS WELL KNOWN, when the fuses blow, caused by a Heavy Short Circuit in the line, thereby suddenly relieving the Engine of its load, great danger from ***Racing*** is imminent; many bad accidents, due solely to this cause, entailing much damage to life and property, are matters of record.

The use of the ***Monarch Stop*** and ***Speed-Limit*** absolutely controls the Engine automatically, and prevents racing under any circumstances. By this device, also, the Engine can be shut down from any portion of the plant, by the use of Electric Buttons.

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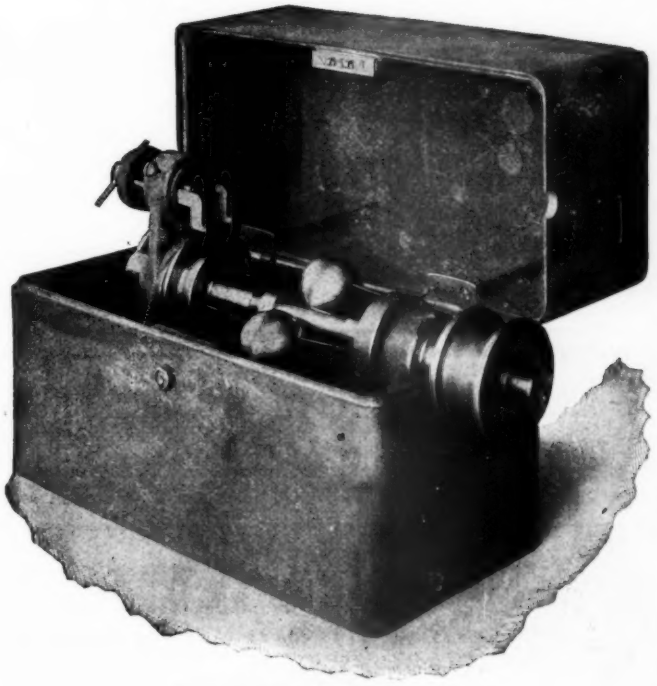

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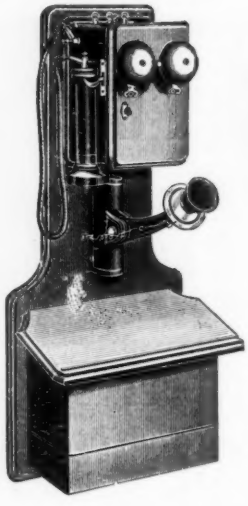

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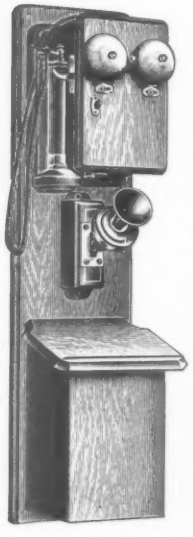
in larger quantities than before. We shall in future as in the past keep the name of "DE VEAU" synonomous with the best in the line.



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We Offer to the Public a New and Marvellous Electric Cable,

As Reliable as a Galvanometer, as Infallible in Action, and Continuously Thermostatic.

Standardized in sizes for all interior electric adaptations. It is the only cable in the world combining Fire and Burglar alarm protection with all other interior electric wiring work, in same insulation.

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By the use of this Cable every infinitesimal part of every wire hereafter installed for whatever purpose in all buildings is made a detective point for the discovery and automatic notification of fire. We have opened up a new and rich field for the Electrical Contractor. If you are not acquainted with us and the Cable, you should be. Write or call and become so.

Write for illustrated and descriptive printed matter.

We own the sole and exclusive right to manufacture and sell the Montauk Multiphase Cable and Central Station Controller, by virtue of the following patents: No. 546,261, Sept. 10, 1895; No. 546,262, Sept. 10, 1895; No. 565,053, Aug. 4, 1896; No. 565,178, Aug. 4, 1896; No. 565,188, Aug. 4, 1896; No. 565,217, Aug. 4, 1896; No. 565,410, Aug. 4, 1896; No. 594,034, Nov. 23, 1897; No. 594,247, Nov. 23, 1897; No. 594,291, Nov. 23, 1897, which broadly cover not only the method of manufacturing, but the basic principle upon which these cables are constructed.

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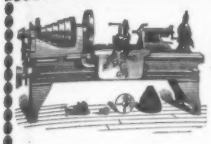

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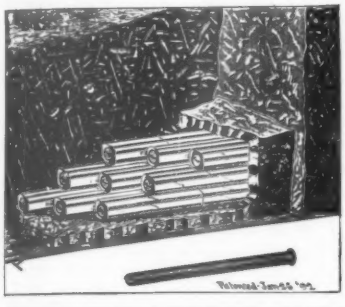

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This conduit is made of vitrified clay, standard size, three inches internal diameter. We can make any size or multiple of ducts desired. Laid with our patent Mandrel, a perfect alignment is insured. We claim for strength, economy, durability, simplicity, cheapness and perfect insulation it is the best. In use by the most prominent companies. Any information cheerfully given.

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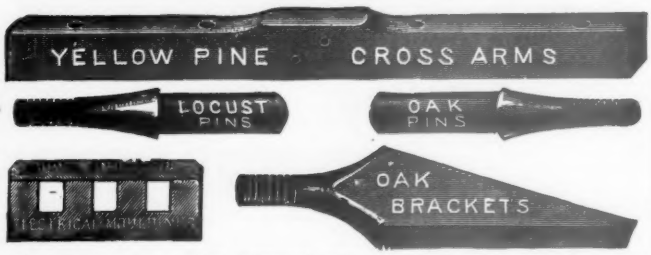

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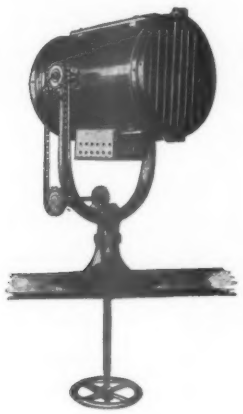

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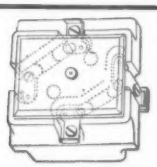

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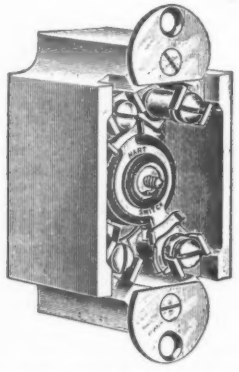

Will fit boxes usually used for "Push-Button" Switches.

No. 602. FRONT PLATE REMOVED.

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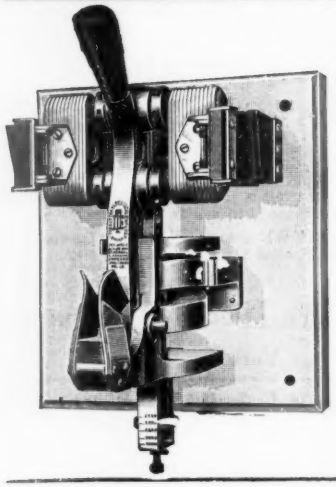

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